Service Manual **A32**

Issue 1.0

FMJ A32, P35 & P35/3 Amplifiers



ARCAM

Contents List

Phono Board L870

Contents

AV8 Phono Board

Circuit Description
Refer to circuit diagram L870 sheet 1

The phono board is a simple single stage RIAA amplifier and consists of two channels of high gain amplification, and the ability to switch between moving magnet (MM) and moving coil (MC) settings.

PSU

The unit derives its ± 15V regulated rails from the unit it is fitted into with only local decoupling capacitors on board.

Interface

The unit connects to the host unit via a 8 way connector.

Amplification

The left channel has designators beginning with 100, and the right with 200. For the purposes of this description the left channel will be described, as the right channel is the same in all respects.

The amplifier is a small signal class A voltage feedback amplifier with switch able gain. The input consists of an actively loaded differential pair of very low noise PNP transistors (TR106, TR107). These transistors are very specific and should only be replaced with identical parts with the E grade high gain. TR100 and TR101 form a current source for the pair, which sets the quiescent current for the entire amplifier. The active load consists of TR110 and TR111, which forms part of the differential current mirror with TR112, TR113 & TR114. This differential stage also has an active load (TR102 & TR103) to keep gain to a maximum.

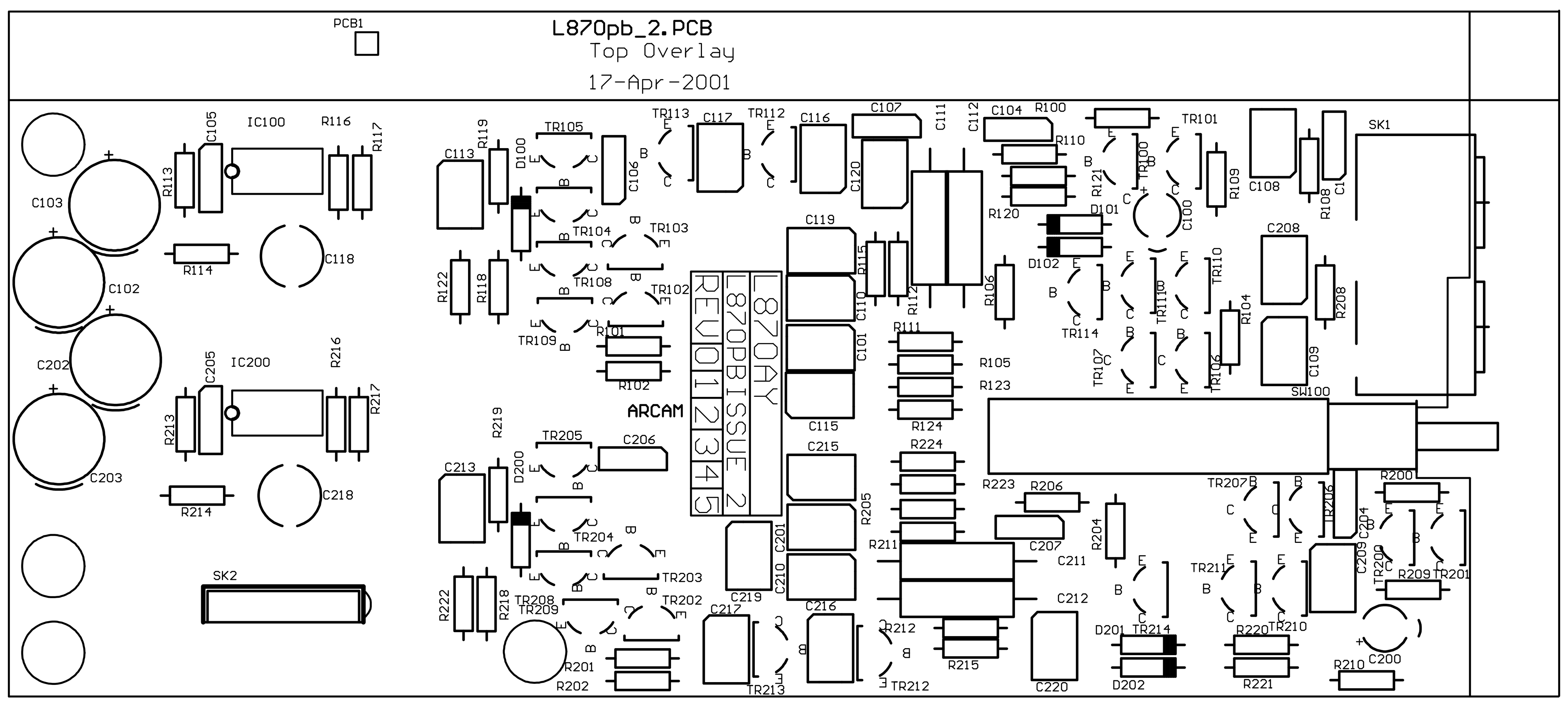
Both of these differential stages are designed to have as much gain as possible to enable the single stage design. The RIAA response is achieved in the feedback network: C101, C110, C111, C112, C119, C120 and R115, R112. C115 is used to correct between MM and MC gains as the amplifier is non-inverting.

SW100 switches between MM and MC. Two poles of the switch change between the different loading required for each type of the cartridge: R108 & C109 for MM and added in parallel for MC R104 & C108. The other two poles change the feedback resister value to alter the gain: R105 for MM and added in parallel for MC R123.

The DC offset is controlled by a non-inverting servo built around IC100. The amount of servo current is different for each gain setting via R111 (MM) and R124 (MC) so that the low frequency high pass point remains the same for both settings. However the high pass point for the circuit is set by C113. This gives a warp filter, stops DC start-up thumps from upsetting DC coupled circuitry and an approximation of the RIAA/IEC curve (-2dB @ 20Hz)

The output is class A buffered by a dual mirror follower (TR104, TR105, TR108, TR109). The quiescent current is set by D100 and R118 and R119.

Closed loop stability is achieved with C16, C117, giving symmetrical slewing capability.



MECHANICAL DATA

LAYER STACKUP	
L870pb_2.GTO	Top Overlay

MATERIAL	FR4
COPPER WEIGHT	1oz
HOLE SIZES	FINISHED (SEE NOTE 2)
ROUTING	SEE NOTE 3
COPPER LAYERS	TWO
MINIMUM WIDTH	X MIL
MINIMUM GAP	X MIL
RESIST	GREEN
IDENT	WHITE
VENDOR CODES	SEE NOTE 4
FINISH	SILVER
SCORING	SEE NOTE 5

NOTES:–

1/ Manufacture in accordance with IPC–A–600F Class 1.
2/ Always use NC drill file as reference.
3/ All routing 2.0mm unless otherwise shown on drill drawing.
4/ Mark month/year of manufacture on ident layer.
5/ Scoring denoted by ->>>- on drill drawing.

GENERAL TOLERANCES
PCB Dims. +/– 0.2mm
Routing +/– 0.1mm
All holes +/–0.08mm
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED

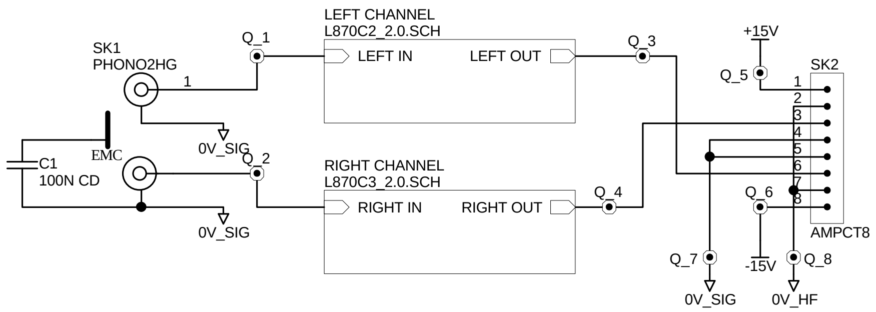
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A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB		E.C.O. No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
	Contact Engineer: JASON GREENSLADE	Contact Tel: +44 (0) 1223 203200	Printed: 17–Apr–2001	Sheet 1 of X		

L870 Phono Board Parts List Issue 2.0

Designator	Part	Description
C1	2A410	CERD 100N 63V -20% +80% RA
C100	2N622	ELST 22U 63V
C101	2D210	PPRO 1N0 5% 63V RA
C102	2P710AS	ELEC 100U 25V SILMIC
C103	2P710AS	ELEC 100U 25V SILMIC
C104	2K410	PEST 100N 63V 10%
C105	2K410	PEST 100N 63V 10%
C106	2K410	PEST 100N 63V 10%
C107	2K410	PEST 100N 63V 10%
C108	2D147W	PPRO W 470P 63V 5% RA
C109	2D110W	PPRO W 100P 63V 5% RA
C110	2D247N	PPRO 4N7 63V 5% RA
C111	2D310	PPRO 10N 63V 1% AXIAL
C112	2D310	PPRO 10N 63V 1% AXIAL
C113	2K510	CAP MKS2 1U0 16V 10%
C115	2D213N	PPRO 1N3 63V 5% RA
C116	2D147W	PPRO W 470P 63V 5% RA
C117	2D147W	PPRO W 470P 63V 5% RA
C118	2U610	ELST NON POLAR 10UF 35V
C119	2D110N	PPRO 100P 63V 5% RA
C120	2D210	PPRO 1N0 5% 63V RA
C200	2N622	ELST 22U 63V
C201	2D210	PPRO 1N0 5% 63V RA
C202	2P710AS	ELEC 100U 25V SILMIC
C203	2P710AS	ELEC 100U 25V SILMIC
C204	2K410	PEST 100N 63V 10%
C205	2K410	PEST 100N 63V 10%
C206	2K410	PEST 100N 63V 10%
C207	2K410	PEST 100N 63V 10%
C208	2D147W	PPRO W 470P 63V 5% RA
C209	2D110W	PPRO W 100P 63V 5% RA
C210	2D247N	PPRO 4N7 63V 5% RA
C211	2D310	PPRO 10N 63V 1% AXIAL
C212	2D310	PPRO 10N 63V 1% AXIAL
C213	2K510	CAP MKS2 1U0 16V 10%
C215	2D213N	PPRO 1N3 63V 5% RA
C216	2D147W	PPRO W 470P 63V 5% RA
C217	2D147W	PPRO W 470P 63V 5% RA
C218	2U610	ELST NON POLAR 10UF 35V
C219	2D110N	PPRO 100P 63V 5% RA
C220	2D210	PPRO 1N0 5% 63V RA
D100	3A4148	SSDIODE 1N4148 75V
D101	3A4148	SSDIODE 1N4148 75V
D102	3A4148	SSDIODE 1N4148 75V
D200	3A4148	SSDIODE 1N4148 75V
D201	3A4148	SSDIODE 1N4148 75V
D202	3A4148	SSDIODE 1N4148 75V
IC100	5B071	IC FET OPAMP TL071
IC200	5B071	IC FET OPAMP TL071
PCB1	L870PB_2	PRINTED CIRCUIT BOARD
R100	1H133	RES MF W4 1% 330R
R101	1H110	RES MF W4 1% 100R
R102	1H110	RES MF W4 1% 100R
R104	1H110	RES MF W4 1% 100R
R105	1H110	RES MF W4 1% 100R
R106	1H110	RES MF W4 1% 100R
R108	1H347	RES MF W4 1% 47K
R109	1H312	RES MF W4 1% 12K
R110	1H312	RES MF W4 1% 12K
R111	1H356	RES MF W4 1% 56K
R112	1H410	RES MF W4 1% 100K
R113	1H410	RES MF W4 1% 100K
R114	1H410	RES MF W4 1% 100K
R115	1H315	RES MF W4 1% 15K
R116	1H522	RES MF W4 1% 2M2

L870 Phono Board Parts List Issue 2.0

Designator	Part	Description
R117	1H522	RES MF W4 1% 2M2
R118	1H022	RES MF W4 1% 22R
R119	1H022	RES MF W4 1% 22R
R120	1H022	RES MF W4 1% 22R
R121	1H022	RES MF W4 1% 22R
R122	1H339	RES MF W4 1% 39K
R123	1H010	RES MF W4 1% 10R
R124	1H256	RES MF W4 1% 5K6
R200	1H133	RES MF W4 1% 330R
R201	1H110	RES MF W4 1% 100R
R202	1H110	RES MF W4 1% 100R
R204	1H110	RES MF W4 1% 100R
R205	1H110	RES MF W4 1% 100R
R206	1H110	RES MF W4 1% 100R
R208	1H347	RES MF W4 1% 47K
R209	1H312	RES MF W4 1% 12K
R210	1H312	RES MF W4 1% 12K
R211	1H356	RES MF W4 1% 56K
R212	1H410	RES MF W4 1% 100K
R213	1H410	RES MF W4 1% 100K
R214	1H410	RES MF W4 1% 100K
R215	1H315	RES MF W4 1% 15K
R216	1H522	RES MF W4 1% 2M2
R217	1H522	RES MF W4 1% 2M2
R218	1H022	RES MF W4 1% 22R
R219	1H022	RES MF W4 1% 22R
R220	1H022	RES MF W4 1% 22R
R221	1H022	RES MF W4 1% 22R
R222	1H339	RES MF W4 1% 39K
R223	1H010	RES MF W4 1% 10R
R224	1H256	RES MF W4 1% 5K6
SK1	8D230	PHONO SKT 2-WAY HOR EMC GOLD
SK2	8K2408	8-WAY AMP CT CONN
SW100	A1013	SW PUSH 4PCO
TR100	4A556	TRANS LF SS P BC556B
TR101	4A556	TRANS LF SS P BC556B
TR102	4A556	TRANS LF SS P BC556B
TR103	4A556	TRANS LF SS P BC556B
TR104	4A556	TRANS LF SS P BC556B
TR105	4A556	TRANS LF SS P BC556B
TR106	4A1085	TRANS LF SS P 2SA1085
TR107	4A1085	TRANS LF SS P 2SA1085
TR108	4A546	TRANS LF SS N BC546B
TR109	4A546	TRANS LF SS N BC546B
TR110	4A546	TRANS LF SS N BC546B
TR111	4A546	TRANS LF SS N BC546B
TR112	4A546	TRANS LF SS N BC546B
TR113	4A546	TRANS LF SS N BC546B
TR114	4A546	TRANS LF SS N BC546B
TR200	4A556	TRANS LF SS P BC556B
TR201	4A556	TRANS LF SS P BC556B
TR202	4A556	TRANS LF SS P BC556B
TR203	4A556	TRANS LF SS P BC556B
TR204	4A556	TRANS LF SS P BC556B
TR205	4A556	TRANS LF SS P BC556B
TR206	4A1085	TRANS LF SS P 2SA1085
TR207	4A1085	TRANS LF SS P 2SA1085
TR208	4A546	TRANS LF SS N BC546B
TR209	4A546	TRANS LF SS N BC546B
TR210	4A546	TRANS LF SS N BC546B
TR211	4A546	TRANS LF SS N BC546B
TR212	4A546	TRANS LF SS N BC546B
TR213	4A546	TRANS LF SS N BC546B
TR214	4A546	TRANS LF SS N BC546B





DRAWING TITLE

A85 PHONO STAGE - TOP LEVEL

Circuit Diagram

Notes:

2 3 4 2 5

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
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00_1051	JAG	22/3/01	PRODUCTION ISSUE	1

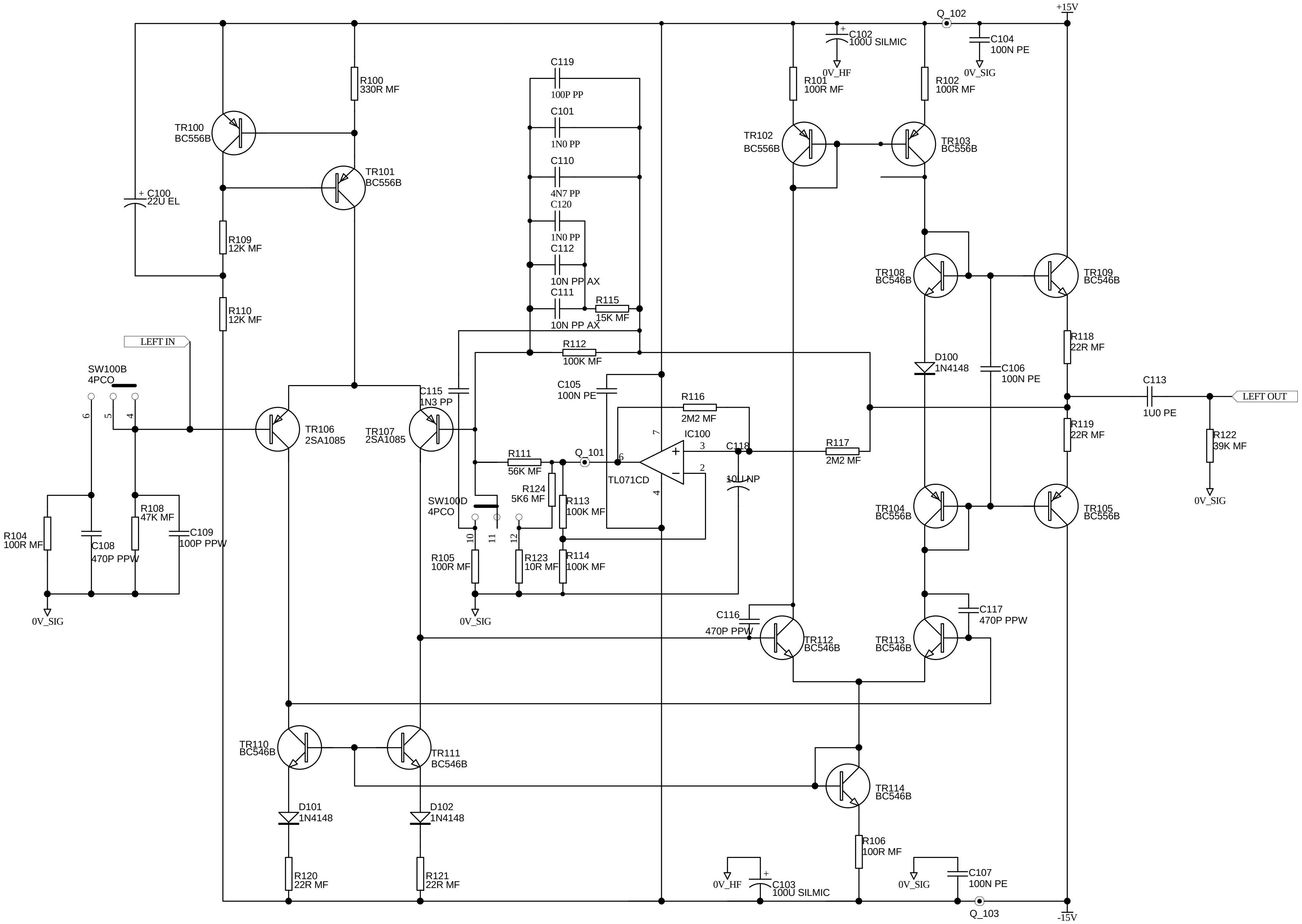
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Date Printed 23-Apr-2001

Drawn by: JBR

Sheet 1 of 3

DRAWING NO. L870C1



DRAWING TITLE

A85 PHONO STAGE - LEFT CHANNEL

Circuit Diagram

2 3 4 2 5

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Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

Notes:

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
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00_1051	JAG	22/3/01	PRODUCTION ISSUE	1

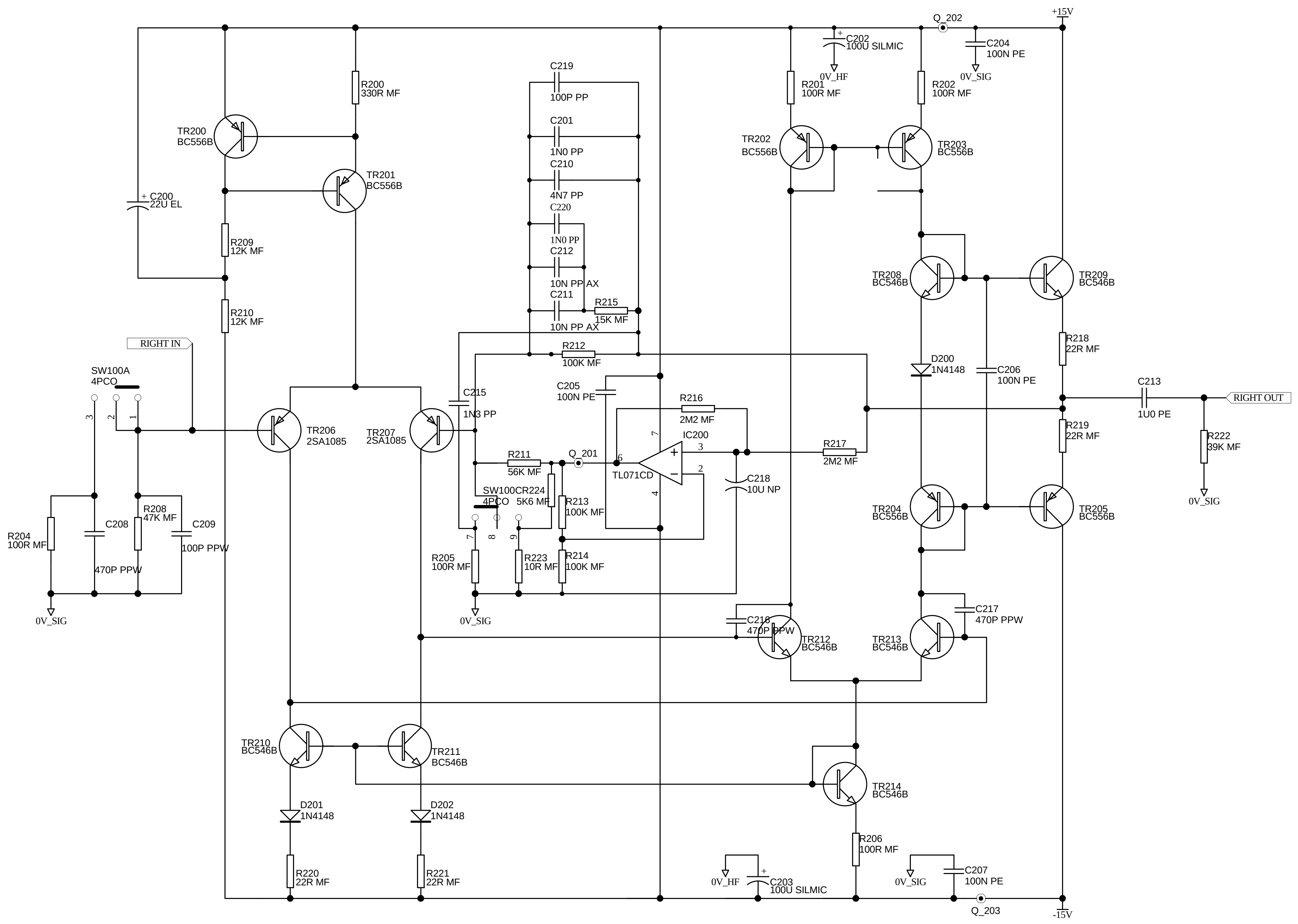
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Date Printed 23-Apr-2001

Drawn by: JBR

Sheet 2 of 3

DRAWING NO. L870C2



DRAWING TITLE

A85 PHONO STAGE - RIGHT CHANNEL

Circuit Diagram

23425

Notes:

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
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00_1051	JAG	22/3/01	PRODUCTION ISSUE	1

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Date Printed: 23-Apr-2001

Drawn by: JBR

Sheet 3 of 3

DRAWING NO. L870C3

Amplifier + PSU Board L882

Contents

Amplifier & PSU Circuit Description
Refer to L882 circuit diagrams

This is the printed circuit board that provides the power supply and output stage amplifiers for the A32 integrated and P35 power amplifiers.

Its function is to:

- Drive the loudspeakers
- Provide an (always on) auxiliary 5VDC supply for the micro controller and display interface
- Receive logic signals from the micro controller to turn on the main amplifier supply relay (mains) and connect either pair of speaker output sockets
- Send logic signals to the micro controller pertaining to the state of the amplifiers (short circuit protection, DC offset protection, thermal protection)
- Receive and demodulate RC5 remote style control codes via the rear panel jack and transmit them to the micro controller
- Send a 12V trigger output via the rear panel jack for control of an auxiliary power amp when the unit is on
- Receive a 12V trigger input from the rear jack (for use in the power amp only version)
- Drive a pair of headphones via attenuating resistor networks The power amplifier is a symmetrical, class B, bipolar junction transistor output, current-feedback design (of which more later) with DC-coupled signal and feedback paths, featuring an active integrating voltage servo to control DC offsets.

It features 'instantaneous' safe operating area protection in addition to sending a signal to the micro to turn off the output relays in the event of user or thermal overload. Since it is a DC-coupled design, the unit senses DC at the output and triggers the micro to turn off the loudspeaker relays in the event of excessive levels (possibly due to a faulty source component or short circuit output transistor).

The output stage uses Sanken specialised 'audio amplifier' power bipolar Darlington transistors which are optimised for use with this type of topology. Consequently the unit has excellent measured performance in terms of noise, slew rate, output impedance and distortion (harmonic and intermodulated) and is essentially load invariant (to a first order the measured performance is independent of the load impedance).

L882 Circuit Sheet 1

The audio input to the amplifier is connected to SK102 (which connects to the output of the preamp PCB). This signal is passed on via SK104A which forms the preamp out connection to the outside world.

SK104B provides the power amp input connection, with switchSW100 selecting between pre / power and integrated modes. The unit is wired as a preamp / power amp combination with the switch depressed, allowing the user to insert a processor or other function (e.g. graphic EQ) between the output of the preamp and the input of the power amp. With the switch in the 'out' position the power amp input socket is ignored and the input to the power amp is connected internally to the output of the preamp. PL100 and PL101 are 'handbag' links fitted to the power amp only version to connect both pairs of phono sockets in parallel for daisy chaining (as there is no preamp output on a power amp).

Relays RLY100 and RLY101 switch the two pairs of loudspeaker output sockets and are controlled by the micro lines describes above. Transistors TR100 and TR101 operate in 'constant current sink' mode which allow relay current to be approximately constant although the main power supply rails will vary with mains input and load conditions. The current is around 20mA per relay.

Star point SP100 is the ground 'mecca' for the entire amplifier (comprising all three PCBs within the unit). All of the separately named grounds are joined explicitly at this point. Different named grounds are used to ensure that no two 'different' grounds share copper, which could compromise the noise, distortion or crosstalk performance of the amplifier.

The loudspeaker output signals are passed to socket SK106 which connects to SK107 and onto the headphone output via the attenuation resistors R103 thru R106.

The hierarchy containing the other sheets is self explanatory. Each of the port names shown on the top sheet connects to the port of the same name on the lower sheets.

L882 Circuit Sheet 2

This sheet contains the power supplies, the rear panel jack socket trigger circuits, the standby relay control and the 'interface'circuits between the output signals of the power amplifiers and the inputs expected by the micro processor.

The mains input enters the unit at SK203, with capacitors C205 and C206 acting as conducted RF suppression. The earth connection is passed on to the chassis (for safety reasons the chassis metalwork remains connected to mains power earth at all times). Switch SW200 is the voltage selector switch, allowing the unit to be operated in 230V or 115V mains countries by switching the dual-primary mains transformers between series and parallel winding. Varistors VR200 and VR201 act to prevent over-voltage surges from damaging the unit. If the user selects 115V operation and then connects the unit to a 230V supply, the varistors will go to a low impedance and blow the primary fuses. Any very high voltage line transients will also be suppressed, helping to eliminate transformer isolation breakdown.

Relay RLY200 switches the primary side of the mains transformer, allowing the micro to control the on / off status of the amplifier. Its contacts are snubbed by capacitors C207 and C208 (to eliminate switching spark transients and prolong relay lifespan). The primary windings of the toroidal mains transformer connect to SK204.

PCB mounted transformer TX200 is powered all the time that mains is present on SK203, irrespective of the on / off status of the amplifier. This is to ensure that the micro processor is always operational and can thus control the mains switching for the main amplifier. Secondary fuse F202 limits the current in the event of a failure mode, as the short circuit primary current of TX200 would be insufficient to blow the mains fuses.

Diodes D200 thru D203, C227 and IC201 provide the 5VDC supply which powers the micro and display PCB and the relay coils. C224 is to reduce diode noise being transmitted back through the leakage capacitance of TX200.

The mains transformer secondary winding is connected to SK200. This is a centre tapped winding, and is used with full bridge rectifier BR200 to produce the main positive and negative supplies for the power amp. C209 and C210 are the large reservoir capacitors, with C211 and C212 acting as high frequency decouplers. The main power supply rails and ground are accessible on SK205 for future module expansion.

The circuitry around SK201A and IC200 is to receive and demodulate remote control commands sent in via the rear panel jack socket. This is for multi-room applications. L200 and C200 form a parallel resonant circuit at approximately 37kHz. The output from this bandpass filter is passed into IC200A where it is ‘chopped’ and fed to IC200B to provide the output signal.

SK201B is a 13VDC signal trigger output which is active whenever the amplifier is powered up. R218 and DZ207 / C223 provide a reference voltage which is buffered by TR200. TR201 and R217 act as a current limit and prevent damage due to a short circuit on the output of SK201B. The maximum current is approximately 65mA.

TR203 and TR202 are a complementary Darlington pair which turn on mains relay RLY200 when activated by a signal from the microprocessor.

TR204 and its associated components are to detect whenever AC mains is present at the IEC socket. This is to notify the microprocessor if the user has unplugged the mains cord, so that it can take the necessary action (muting all the outputs and switching off the mains relay). The reservoir capacitors should last at least 4 mains cycles which gives the microprocessor plenty of time for a controlled shutdown.

TR204 forms a monostable circuit. Each cycle of AC turns on TR204 via R211. TR204 then ‘shunts’ C229 ensuring that it is kept at a low potential. If more than one mains cycle is missing, then R219 charges up C229 sufficiently to trigger Schmitt inverter IC202E thus passing on a logic signal to the microprocessor. The use of a Schmitt inverter for IC202 is to ensure that the micro receives ‘clean’ logic levels - the hysteresis voltage (about 0.5V) is sufficient to prevent circuit noise from producing a string of ‘ghost’ signals when analogue levels are near the threshold point.

TH200 is a positive tempco thermistor placed adjacent to the heatsink on which the output transistors are mounted. When the temperature of the thermistor exceeds 90 degrees Celsius the thermistor goes to a high impedance and so the input to IC202F goes low. This triggers a HIGH output to the micro indicating thermal overload.

The VI protection signals from the left and right channels pass into IC202A and IC202B respectively, to be ‘cleaned up’ via the Schmitt trigger. They are then NOR’d using TR205 which sends a HIGH signal to the micro in the event of either channel suffering a short circuit or current overload. Exactly the same approach is used for the DC fault lines using IC202C and IC202D.

L882 Circuit Sheet 3

This is the main audio power amplifier circuit. The amplifier is a class B design, which uses SAP ‘audio’ transistors in a symmetrical current feedback configuration. Input and feedback paths are DC coupled and there is an active integrating servo to remove DC offsets from the output.

The basic principle of operation is follows:
The input signal is amplified by a factor of 2 in IC300A. This drives a 44˜ impedance to ground causing the supply pin currents to change with the signal level. These changing supply pin currents are then ‘reflected’ by a pair of complementary Wilson mirrors and passed on to a series of buffer transistors before being connected to the load. The ‘feedback current’ flows back from the output terminal via R331 and R332 and attempts to provide the current necessary to allow IC300A to swing its output without drawing excessive current from its supply pins, thus making the change in supply current very small indeed. This is why the term ‘current feedback’ is used - it is the current flowing in the feedback resistors that sets the overall gain of the amplifier.

IC300B acts as an inverting integrator and its purpose is to remove DC from the loudspeaker output. Any positive DC offset will cause the output of IC300B to go negative, thus increasing the current in its negative supply pin and pulling the output voltage back towards zero. R330 and C317 set the time constant of this integrator (0.47 seconds) so that audio frequency components are ignored and only DC and subsonic frequencies are removed.

The input to the amplifier is limited to ±5.4V via back-to-back zener diodes DZ302 and DZ303. This is to prevent the user from grossly overdriving the input to the amplifier and possibly causing damage. The diodes appear before series resistor R324 so that their variable capacitance does not introduce high frequency harmonic distortion.

R324, R327 and C316 act as an input filter - this is a first order low pass filter with a corner frequency of around 340kHz to prevent RF signals from being injected into the front end of the amplifier. The corner frequency was chosen such that the phase shift introduced is less than 5˜ at 20kHz (considered by the AES to be the minimum perceptible relative amount by the human ear). The input impedance of the amplifier is 23kW at DC, falling to around 14kW at 20kHz.

Operational amplifier IC300A is acting as a non-inverting gain of 2, driving the input signal into a 44W impedance to ground via R322 and R337. Its output voltage will be an accurate amplification of its input voltage (i.e. the signal on pin 1 should look identical to that on pin 3 but at twice the amplitude). The op-amp is used in a slightly unusual configuration here, in that its power supply pins are used as a (current) output, and its output pin is used as a (current) feedback.

Transistors TR311 and TR303 supply the ±15V rails to the op-amp, and act as cascades to pass its supply pin currents through to the current mirrors, which sit at a potential too high for the op-amp to be connected directly.

TR300, TR301 and TR321 form a PNP Wilson current mirror, which reflects the current sunk by the positive supply pin of IC300. Likewise TR314, TR315 and TR320 form an NPN Wilson current mirror, which reflects the current sourced by the negative supply pin of IC300.

R315 thru R318 provide emitter degeneration of approximately 300mV for the current mirrors (as they pass about 3mA DC in quiescent conditions), to ensure accurate operation independent of the small variations between the transistors in the current mirrors. They also ensure that the current passing down the next stage is reasonably constant as the internal temperature of the amplifier changes, swamping out small thermal variations in the VBE of the mirror transistors.

R319 and R320 slightly decouple the rails to the current mirrors from the main power rails of the amplifier, to allow the bootstrap circuit to operate. The bootstrap consists of C302 and C306 with metal film power resistors R352 and R353. The bootstrap is provided to allow the power supply rails of the current mirrors to go up and down slightly with the output signal into the loudspeaker. This enables the driver stage to fully saturate the output transistors and thus give the greatest power output and best thermal efficiency for any given power rail voltage. The voltage on the ‘inside’ end of R319 and R320 will vary by about 12 volts peak to peak at full output power, rising above the main power rails during signal peaks.

C307 and C308 with R333 and R335 provide the compensation necessary to ensure stability when the loop is closed. They are Miller capacitors which dramatically reduce the transimpedance (i.e. current to voltage gain) of the current mirrors at high frequencies. The present value of 47pF provides for a unity gain open loop bandwidth of around 75MHz, whilst ensuring a closed loop gain margin of around 6dB (note that gain margin in a current feedback design is not dependent on system bandwidth to a first order approximation). R333 and R335 provide a 'zero' in the open loop frequency response which is tailored to give the best time domain performance (i.e. to make high frequency square waves look square with minimal ringing or overshoot).

DZ304 and C311 provide a fixed 4.7V bias voltage to allow the following stages to operate correctly. C311 is there to ensure that both halves of the following stage receive an equal AC signal component at high frequency.

TR310 and TR307 are the 'pre-driver' transistors, which act to buffer the outputs from the preceding stage and drive the Darlington output power transistors. TR309 and R321 act as a current limit, to ensure that the emitter current of TR310 does not exceed 30mA in a fault condition. TR306 and R323 provide the same function for TR307.

R338 and R339 are to loosely couple the outputs of the pre-driver stage to the inputs of the Darlington power output devices. This is so that the inbuilt temperature sensing diodes of the output transistors can accurately control the quiescent current of the output stage as the junction temperature of the power devices varies. C312 and C318 ensure that both halves of the output stage receive an equal AC signal component.

The output transistors are TR318 and TR319. These are Sanken SAP15N and SAP15P devices respectively. They are specially designed for audio power amplifier use. In addition to high current gain (Darlington with a typical h_{FE} of 20,000) they provide an inbuilt emitter resistor (thick film power resistor of 0W22) and temperature sensing diodes which closely and rapidly track the V_{BE} versus temperature characteristic of the power transistors, allowing for easy, fast-responding and reasonably accurate control of quiescent current.

RV300 is for fine trimming of the quiescent current. PL300 provides a convenient measuring point for this, which is short-circuit protected in the event of a slip with the multimeter probe! All of the remaining circuitry to the right of TR318 and TR319 is essentially for output stage protection...

Transistors TR312 and TR304, along with the network of resistors and capacitors to which they are connected, provide instantaneous overload protection of the output stage. This is a conventional single slope VI protection scheme, which allows much greater current to be delivered into a rated load than into a short circuit. The values allow for 18A peak delivery (at clip) into a purely resistive load, 7A peak (at clip) into a purely capacitive load and around 4A peak into a short circuit. R345, C303, R346 and C304 allow these values to be doubled for short transient bursts (approximately 2.7 milliseconds) so that impulsive musical transients can be delivered cleanly with minimal risk of damaging the output transistors.

TR313, TR302 and their associated components send a signal to the microprocessor when the instantaneous protection circuits are having to work 'hard' to prevent amplifier overload. This instructs the micro that the user is severely abusing the amplifier and will switch off the loudspeaker relays to prevent possible permanent damage. In reality, if you short circuit the outputs at any appreciable volume level, this circuit will trigger and the microprocessor will turn off the loudspeaker relays and send a signal to the user.

R308, R314 and C320 form a low pass filter from which the DC detection circuits can sense excessive DC at the loudspeaker outputs. If there is any positive DC present, then TR316 will turn on, which turns on TR305 and thus activates the DC protection line to the micro, turning off the loudspeaker relays.

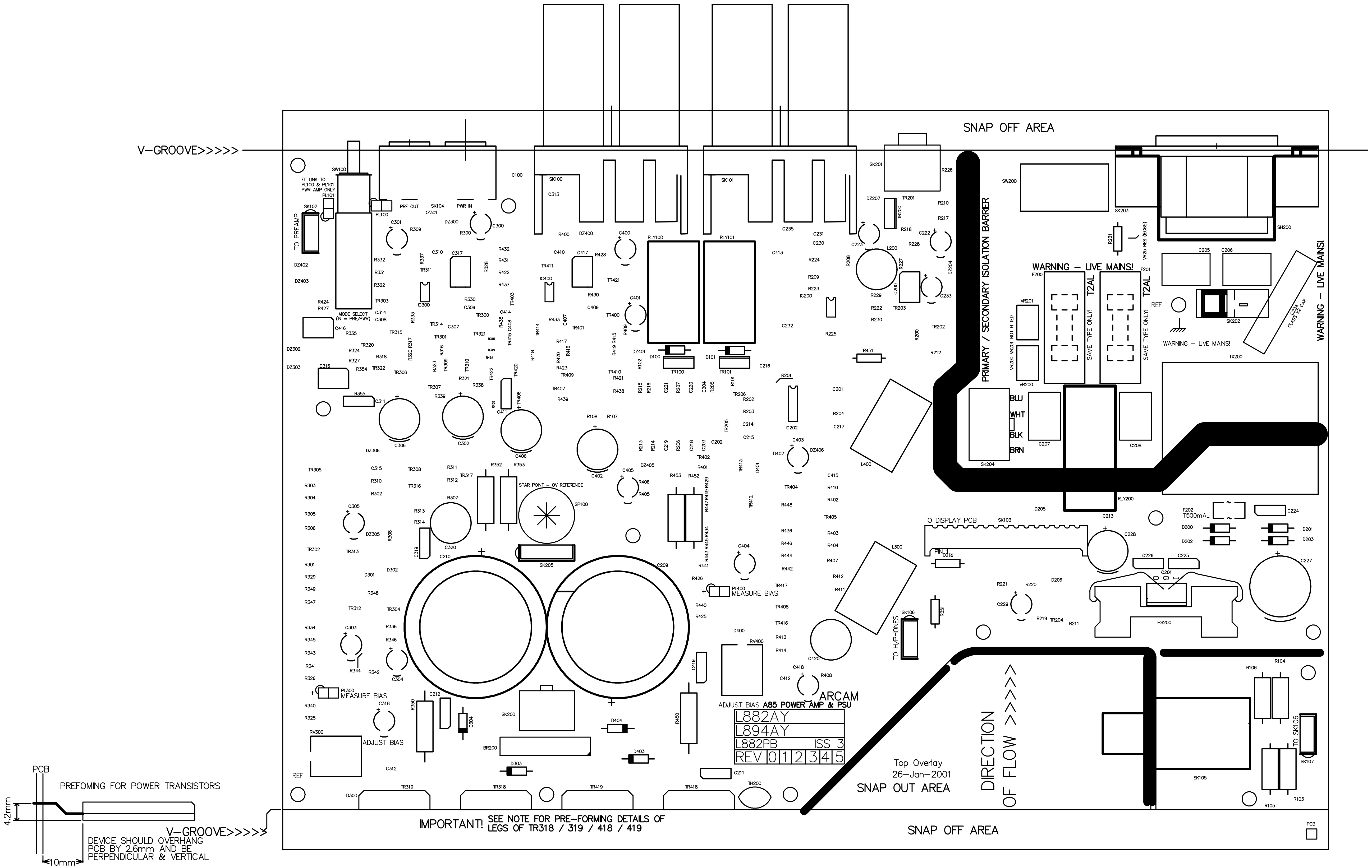
If there is any negative DC present, then TR308 will turn on, which turns on TR317 which then turns on TR305 in turn, causing the same effect.

R350 and C319 are the Zobel network which is provided to ensure the amplifier 'sees' a constant and resistive load at very high frequencies, to aid stability, although the amplifier will be stable without the Zobel fitted.

C313 locally couples the 'high frequency' and loudspeaker ground returns together at the output to overcome the effects of track inductance back to the star point. C309 couples the 'high frequency' and signal grounds together at the input for the same reason.

D303 and D304 are 'flyback' diodes to protect the output transistors from reverse bias when the amplifier is heavily clipped into an inductive load (such as a loudspeaker voice coil!)

Sheet 4 is an identical copy of sheet 3 so I will not describe it separately.


SNAP OFF AREA
V-GROOVE>>>>>
TO PREAMP
FIT LINK TO PL100 & PL101 PWR AMP ONLY
MODE SELECT (IN = PRE/PWR)
PRE OUT
PWR IN
PRIMARY / SECONDARY ISOLATION BARRIER
WARNING - LIVE MAINS!
T2AL
SAME TYPE ONLY!
REF
WARNING - LIVE MAINS!
BLU
WHT
BLK
BRN
STAR POINT - 0V REFERENCE
TO DISPLAY PCB
T500mAL
MEASURE BIAS
TO H/PHONES
ADJUST BIAS
ARCAM
ADJUST BIAS A85 POWER AMP & PSU
L882AY
L894AY
L882PB ISS 3
REV 0 1 2 3 4 5
Top Overlay
26-Jan-2001
SNAP OUT AREA
DIRECTION OF FLOW >>>>>
TO SK106
PCB
PREFOMING FOR POWER TRANSISTORS
4.2mm
10mm
DEVICE SHOULD OVERHANG PCB BY 2.6mm AND BE PERPENDICULAR & VERTICAL
IMPORTANT! SEE NOTE FOR PRE-FORMING DETAILS OF LEGS OF TR318 / 319 / 418 / 419
SNAP OFF AREA

L882 Amplifier and PSU Board Parts List Issue 3.0

Designator	Part	Description
BR200	3BGBU8D	BRIDGE RECTIFIER 8A 200V
C100	2C210	MLC 1N0 50V X7R 10% SM
C200	2D168	PPRO 680P 5% 63V RA
C201	2C410	MLC 100N 50V X7R 10% SM
C202	2C410	MLC 100N 50V X7R 10% SM
C203	2C410	MLC 100N 50V X7R 10% SM
C204	2C410	MLC 100N 50V X7R 10% SM
C205	2K233	SUPPR CAP 3N3 250V
C206	2K233	SUPPR CAP 3N3 250V
C207	2K233	SUPPR CAP 3N3 250V
C208	2K233	SUPPR CAP 3N3 250V
C209	2N910A	ELST 10m 63V RA 35mm
C210	2N910A	ELST 10m 63V RA 35mm
C211	2H410	PCRB 100N 100V 10% RA 5mm
C212	2H410	PCRB 100N 100V 10% RA 5mm
C213	2C310	MLC 10N 50V X7R 10% SM
C214	2C310	MLC 10N 50V X7R 10% SM
C215	2C310	MLC 10N 50V X7R 10% SM
C216	2C310	MLC 10N 50V X7R 10% SM
C217	2C310	MLC 10N 50V X7R 10% SM
C218	2C310	MLC 10N 50V X7R 10% SM
C219	2C310	MLC 10N 50V X7R 10% SM
C220	2C410	MLC 100N 50V X7R 10% SM
C221	2C310	MLC 10N 50V X7R 10% SM
C222	2N610	ELST 10U 50V
C223	2N610	ELST 10U 50V
C224	2A410	CERD 100N 63V 20% RA
C225	2A410	CERD 100N 63V 20% RA
C226	2A410	CERD 100N 63V 20% RA
C227	2N833	ELST 3M3 25V
C228	2N810A	ELST 1M0 10V
C229	2N622	ELST 22U 63V
C230	2C310	MLC 10N 50V X7R 10% SM
C231	2C210	MLC 1N0 50V X7R 10% SM
C232	2C410	MLC 100N 50V X7R 10% SM
C233	2N610	ELST 10U 50V
C234	2D422	220NF CLASS X2 CAP 275VRMS
C235	2C210	MLC 1N0 50V X7R 10% SM
C300	2N710	ELST 100U 25V
C301	2N710	ELST 100U 25V
C302	2N710B	ELST 100U 100V
C303	2N710	ELST 100U 25V
C304	2N710	ELST 100U 25V
C305	2N610	ELST 10U 50V
C306	2N710B	ELST 100U 100V
C307	2C110	MLC 100P 50V NPO 5% SM
C308	2C110	MLC 100P 50V NPO 5% SM
C309	2C410	MLC 100N 50V X7R 10% SM
C310	2C410	MLC 100N 50V X7R 10% SM
C311	2H410	PCRB 100N 100V 10% RA 5mm
C312	2C310	MLC 10N 50V X7R 10% SM
C313	2C410	MLC 100N 50V X7R 10% SM
C314	2C410	MLC 100N 50V X7R 10% SM
C315	2C410	MLC 100N 50V X7R 10% SM
C316	2D147W	PPRO W 470P 63V 5% RA
C317	2K447	PEST 470N 63V 10%
C318	2N610	ELST 10U 50V
C319	2K410	PEST 100N 63V 10%
C320	2V710	ELST NON POLAR 100UF 16V
C400	2N710	ELST 100U 25V
C401	2N710	ELST 100U 25V
C402	2N710B	ELST 100U 100V

L882 Amplifier and PSU Board Parts List Issue 3.0

Designator	Part	Description
C403	2N710	ELST 100U 25V
C404	2N710	ELST 100U 25V
C405	2N610	ELST 10U 50V
C406	2N710B	ELST 100U 100V
C407	2C110	MLC 100P 50V NPO 5% SM
C408	2C110	MLC 100P 50V NPO 5% SM
C409	2C410	MLC 100N 50V X7R 10% SM
C410	2C410	MLC 100N 50V X7R 10% SM
C411	2H410	PCRB 100N 100V 10% RA 5mm
C412	2C310	MLC 10N 50V X7R 10% SM
C413	2C410	MLC 100N 50V X7R 10% SM
C414	2C410	MLC 100N 50V X7R 10% SM
C415	2C410	MLC 100N 50V X7R 10% SM
C416	2D147W	PPRO W 470P 63V 5% RA
C417	2K447	PEST 470N 63V 10%
C418	2N610	ELST 10U 50V
C419	2K410	PEST 100N 63V 10%
C420	2V710	ELST NON POLAR 100UF 16V
D100	3B4003	RECTIFIER 1N4003F 1A 200V
D101	3B4003	RECTIFIER 1N4003F 1A 200V
D200	3B4003	RECTIFIER 1N4003F 1A 200V
D201	3B4003	RECTIFIER 1N4003F 1A 200V
D202	3B4003	RECTIFIER 1N4003F 1A 200V
D203	3B4003	RECTIFIER 1N4003F 1A 200V
D205	3AS16W	DIODE SS SM BAS16W
D206	3AS16W	DIODE SS SM BAS16W
D300	3AS16W	DIODE SS SM BAS16W
D301	3AS16W	DIODE SS SM BAS16W
D302	3AS16W	DIODE SS SM BAS16W
D303	3B4003	RECTIFIER 1N4003F 1A 200V
D304	3B4003	RECTIFIER 1N4003F 1A 200V
D400	3AS16W	DIODE SS SM BAS16W
D401	3AS16W	DIODE SS SM BAS16W
D402	3AS16W	DIODE SS SM BAS16W
D403	3B4003	RECTIFIER 1N4003F 1A 200V
D404	3B4003	RECTIFIER 1N4003F 1A 200V
DZ204	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ207	3CW315V	ZENER 15V OW35 SM SOT23
DZ300	3CW315V	ZENER 15V OW35 SM SOT23
DZ301	3CW315V	ZENER 15V OW35 SM SOT23
DZ302	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ303	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ305	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ306	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ400	3CW315V	ZENER 15V OW35 SM SOT23
DZ401	3CW315V	ZENER 15V OW35 SM SOT23
DZ402	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ403	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ405	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ406	3CW34V7	ZENER 4V7 OW 35 SM SOT23
EL	8M101	EARTH LEAD
F200	C12207	FUSE 20mm 2A AS
F200	F022	INS COVER PCB FUSEHOLDER
F200	8S004	FUSEHOLDER 20mm PCB
F201	F022	INS COVER PCB FUSEHOLDER
F201	8S004	FUSEHOLDER 20mm PCB
F201	C12207	FUSE 20mm 2A AS
F202	C3501	FUSE R452 T500mA
HS200	F008	HEATSINK TO220 8.6 DEGC/W
HS200	F006	HEATSINK CLIP TO220 13/8.6 DC/W
IC200	5M393AD	IC COMPARATOR SM DUAL LM393A
IC201	5D7805	IC VREG POS 7805

L882 Amplifier and PSU Board Parts List Issue 3.0

Designator	Part	Description
IC202	5J7414D	SURFACE MOUNT HEX SCHMITT TRIGGER
IC300	5B072D	IC AUDIO SM DUAL TL072
IC400	5B072D	IC AUDIO SM DUAL TL072
L200	7D327	27mH INDUCTOR
L300	7D002C	INDUCT 2U2 12x20mm
L400	7D002C	INDUCT 2U2 12x20mm
PCB	L882PB_3	PRINTED CIRCUIT BOARD
PL100	8K6201	2WAY MOLEX VERT MALE CONNECTOR
PL101	8K6201	2WAY MOLEX VERT MALE CONNECTOR
PL300	8K6201	2WAY MOLEX VERT MALE CONNECTOR
PL400	8K6201	2WAY MOLEX VERT MALE CONNECTOR
R100	1H010	RES MF W4 1% 10R
R101	1A110	RES SM W4 1% 100R 1206
R102	1A110	RES SM W4 1% 100R 1206
R103	1.00E+133	RES CF 1W 330R 5%
R104	1.00E+133	RES CF 1W 330R 5%
R105	1.00E+110	RES CF 1W 100R 5%
R106	1.00E+110	RES CF 1W 100R 5%
R107	1A122	RES SM W4 1% 220R 1206
R108	1A122	RES SM W4 1% 220R 1206
R200	1A210	RES SM W4 1% 1K0 1206
R201	1A210	RES SM W4 1% 1K0 1206
R202	1A210	RES SM W4 1% 1K0 1206
R203	1A210	RES SM W4 1% 1K0 1206
R204	1A210	RES SM W4 1% 1K0 1206
R205	1A210	RES SM W4 1% 1K0 1206
R206	1A210	RES SM W4 1% 1K0 1206
R207	1A210	RES SM W4 1% 1K0 1206
R208	1A310	RES SM W4 1% 10K 1206
R209	1A310	RES SM W4 1% 10K 1206
R210	1A310	RES SM W4 1% 10K 1206
R211	1A310	RES SM W4 1% 10K 1206
R212	1A247	RES SM W4 1% 4K7 1206
R213	1A247	RES SM W4 1% 4K7 1206
R214	1A247	RES SM W4 1% 4K7 1206
R215	1A247	RES SM W4 1% 4K7 1206
R216	1A247	RES SM W4 1% 4K7 1206
R217	1A010	RES SM W4 1% 10R 1206
R218	1A310	RES SM W4 1% 10K 1206
R219	1A218	RES SM W4 1% 1K8 1206
R220	1A010	RES SM W4 1% 10R 1206
R221	1A010	RES SM W4 1% 10R 1206
R222	1A310	RES SM W4 1% 10K 1206
R223	1A310	RES SM W4 1% 10K 1206
R224	1A218	RES SM W4 1% 1K8 1206
R225	1A218	RES SM W4 1% 1K8 1206
R226	1A147	RES SM W4 1% 470R 1206
R227	1A210	RES SM W4 1% 1K0 1206
R228	1A410	RES SM W4 1% 100K 1206
R229	1A410	RES SM W4 1% 100K 1206
R230	1A215	RES SM W4 1% 1K5 1206
R231	1K515	RES W25 5% VR25 1M5
R300	1A310	RES SM W4 1% 10K 1206
R301	1A310	RES SM W4 1% 10K 1206
R302	1A310	RES SM W4 1% 10K 1206
R303	1A310	RES SM W4 1% 10K 1206
R304	1A310	RES SM W4 1% 10K 1206
R305	1A310	RES SM W4 1% 10K 1206
R306	1A310	RES SM W4 1% 10K 1206
R307	1A310	RES SM W4 1% 10K 1206
R308	1A310	RES SM W4 1% 10K 1206
R309	1A310	RES SM W4 1% 10K 1206

L882 Amplifier and PSU Board Parts List Issue 3.0

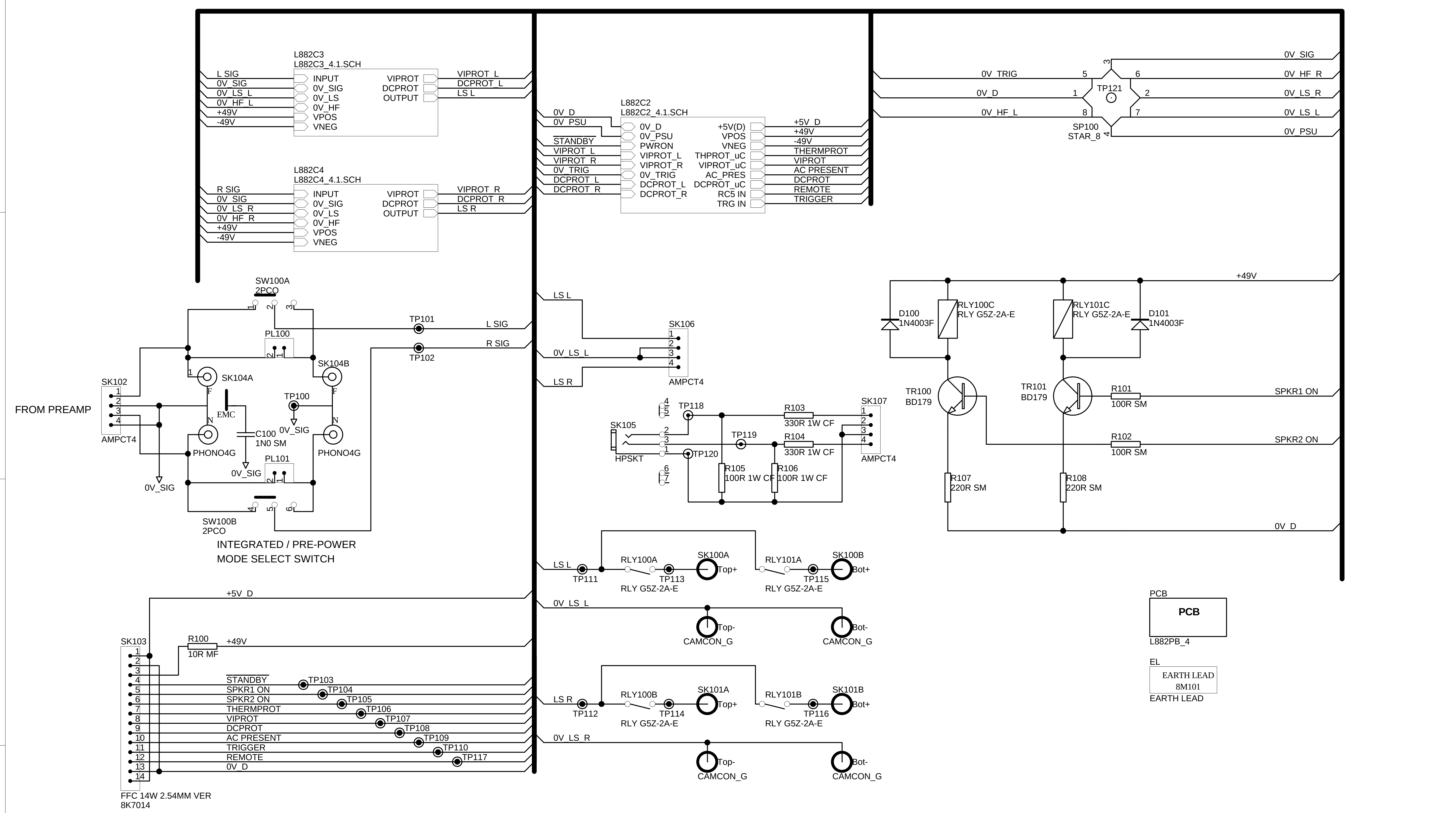
Designator	Part	Description
R310	1A247	RES SM W4 1% 4K7 1206
R311	1A310	RES SM W4 1% 10K 1206
R312	1A310	RES SM W4 1% 10K 1206
R313	1A310	RES SM W4 1% 10K 1206
R314	1A247	RES SM W4 1% 4K7 1206
R315	1A110	RES SM W4 1% 100R 1206
R316	1A110	RES SM W4 1% 100R 1206
R317	1A110	RES SM W4 1% 100R 1206
R318	1A110	RES SM W4 1% 100R 1206
R319	1A110	RES SM W4 1% 100R 1206
R320	1A110	RES SM W4 1% 100R 1206
R321	1A022	RES SM W4 1% 22R 1206
R322	1A022	RES SM W4 1% 22R 1206
R323	1A022	RES SM W4 1% 22R 1206
R324	1A210	RES SM W4 1% 1K0 1206
R325	1A210	RES SM W4 1% 1K0 1206
R326	1A210	RES SM W4 1% 1K0 1206
R327	1A322	RES SM W4 1% 22K 1206
R328	1A247	RES SM W4 1% 4K7 1206
R329	1A247	RES SM W4 1% 4K7 1206
R330	1A510	RES SM W4 1% 1M0 1206
R331	1A215	RES SM W4 1% 1K5 1206
R332	1A218	RES SM W4 1% 1K8 1206
R333	1A233	RES SM W4 1% 3K3 1206
R334	1A322	RES SM W4 1% 22K 1206
R335	1A233	RES SM W4 1% 3K3 1206
R336	1A322	RES SM W4 1% 22K 1206
R337	1A022	RES SM W4 1% 22R 1206
R338	1A115	RES SM W4 1% 150R 1206
R339	1A115	RES SM W4 1% 150R 1206
R340	1A410	RES SM W4 1% 100K 1206
R341	1A133	RES SM W4 1% 330R 1206
R342	1A133	RES SM W4 1% 330R 1206
R343	1A110	RES SM W4 1% 100R 1206
R344	1A110	RES SM W4 1% 100R 1206
R345	1A000	RES SM W4 1% 0R0 1206
R346	1A000	RES SM W4 1% 0R0 1206
R347	1A110	RES SM W4 1% 100R 1206
R348	1A110	RES SM W4 1% 100R 1206
R349	1A110	RES SM W4 1% 100R 1206
R350	1C856	RES CF 2W 5R6 5%
R351	1H010	RES MF W4 1% 10R
R352	1J147	RES 2W MF 5% 470R
R353	1J147	RES 2W MF 5% 470R
R354	1A210	RES SM W4 1% 1K0 1206
R355	1A268	RES SM W4 1% 6K8 1206
R400	1A310	RES SM W4 1% 10K 1206
R401	1A310	RES SM W4 1% 10K 1206
R402	1A310	RES SM W4 1% 10K 1206
R403	1A310	RES SM W4 1% 10K 1206
R404	1A310	RES SM W4 1% 10K 1206
R405	1A310	RES SM W4 1% 10K 1206
R406	1A310	RES SM W4 1% 10K 1206
R407	1A310	RES SM W4 1% 10K 1206
R408	1A310	RES SM W4 1% 10K 1206
R409	1A310	RES SM W4 1% 10K 1206
R410	1A247	RES SM W4 1% 4K7 1206
R411	1A310	RES SM W4 1% 10K 1206
R412	1A310	RES SM W4 1% 10K 1206
R413	1A310	RES SM W4 1% 10K 1206
R414	1A247	RES SM W4 1% 4K7 1206
R415	1A110	RES SM W4 1% 100R 1206

L882 Amplifier and PSU Board Parts List Issue 3.0

Designator	Part	Description
R416	1A110	RES SM W4 1% 100R 1206
R417	1A110	RES SM W4 1% 100R 1206
R418	1A110	RES SM W4 1% 100R 1206
R419	1A110	RES SM W4 1% 100R 1206
R420	1A110	RES SM W4 1% 100R 1206
R421	1A022	RES SM W4 1% 22R 1206
R422	1A022	RES SM W4 1% 22R 1206
R423	1A022	RES SM W4 1% 22R 1206
R424	1A210	RES SM W4 1% 1K0 1206
R425	1A210	RES SM W4 1% 1K0 1206
R426	1A210	RES SM W4 1% 1K0 1206
R427	1A322	RES SM W4 1% 22K 1206
R428	1A247	RES SM W4 1% 4K7 1206
R429	1A247	RES SM W4 1% 4K7 1206
R430	1A510	RES SM W4 1% 1M0 1206
R431	1A215	RES SM W4 1% 1K5 1206
R432	1A218	RES SM W4 1% 1K8 1206
R433	1A233	RES SM W4 1% 3K3 1206
R434	1A322	RES SM W4 1% 22K 1206
R435	1A233	RES SM W4 1% 3K3 1206
R436	1A322	RES SM W4 1% 22K 1206
R437	1A022	RES SM W4 1% 22R 1206
R438	1A115	RES SM W4 1% 150R 1206
R439	1A115	RES SM W4 1% 150R 1206
R440	1A410	RES SM W4 1% 100K 1206
R441	1A133	RES SM W4 1% 330R 1206
R442	1A133	RES SM W4 1% 330R 1206
R443	1A110	RES SM W4 1% 100R 1206
R444	1A110	RES SM W4 1% 100R 1206
R445	1A000	RES SM W4 1% 0R0 1206
R446	1A000	RES SM W4 1% 0R0 1206
R447	1A110	RES SM W4 1% 100R 1206
R448	1A110	RES SM W4 1% 100R 1206
R449	1A110	RES SM W4 1% 100R 1206
R450	1C856	RES CF 2W 5R6 5%
R451	1H010	RES MF W4 1% 10R
R452	1J147	RES 2W MF 5% 470R
R453	1J147	RES 2W MF 5% 470R
R454	1A210	RES SM W4 1% 1K0 1206
R455	1A268	RES SM W4 1% 6K8 1206
RLY100	A207	RELAY G5Z-2A-E 24V
RLY101	A207	RELAY G5Z-2A-E 24V
RLY200	A219	RELAY MAINS DPDT 5V 5A
RV300	6F110	PRES 100R LIN HORIZ
RV400	6F110	PRES 100R LIN HORIZ
SH200	E5402	MAINS EMC SHIELD
SK100	8D418G	CAMCON BINDING POST 4WAY GOLD
SK101	8D418G	CAMCON BINDING POST 4WAY GOLD
SK102	8K2404	4-WAY AMP CT CONN
SK103	8K7014	FFC 14W 2.54MM VER PTH
SK104	8D225	PHONO SKT 4-WAY EMC GOLD
SK105	8D301	STEREO JACK PCB
SK106	8K2404	4-WAY AMP CT CONN
SK107	8K2404	4-WAY AMP CT CONN
SK200	8K2306	MOLEX MINI FIT HCS 6 WAY
SK201	8D302	MIN JACK DUAL 3.5mm HSJ1002-01-1020
SK202	8Q003	CAGE CLAMP 16A 1 WAY ARC003-236
SK203	8A001	IEC MAINS CONN PCB INS PX
SK204	8K2308	MOLEX MINI FIT HCS 8 WAY
SK205	8K2406	6-WAY AMP CT CONN
SW100	A1008	SW PUSH 2PCO
SW200	A1404	VOLTAGE SELECTOR SLIDE SWITCH

L882 Amplifier and PSU Board Parts List Issue 3.0

Designator	Part	Description
TH200	1T002	THERMISTOR SIEMENS B59008
TR100	4B179	NPN TRANS MP BD179
TR101	4B179	NPN TRANS MP BD179
TR200	4B179	NPN TRANS MP BD179
TR201	4AFMMT497	TRANS LF SS N SM FMMT497
TR202	4AFMMT597	TRANS LF SS P SM FMMT597
TR203	4AFMMT497	TRANS LF SS N SM FMMT497
TR204	4A849B	TRANS LF SS N SM BC849B
TR205	4A856B	TRANS LF SS P SM BC856B
TR206	4A856B	TRANS LF SS P SM BC856B
TR300	4AFMMT597	TRANS LF SS P SM FMMT597
TR301	4AFMMT597	TRANS LF SS P SM FMMT597
TR302	4AFMMT597	TRANS LF SS P SM FMMT597
TR303	4AFMMT597	TRANS LF SS P SM FMMT597
TR304	4AFMMT597	TRANS LF SS P SM FMMT597
TR305	4AFMMT597	TRANS LF SS P SM FMMT597
TR306	4AFMMT597	TRANS LF SS P SM FMMT597
TR307	4AFMMT597	TRANS LF SS P SM FMMT597
TR308	4AFMMT597	TRANS LF SS P SM FMMT597
TR309	4AFMMT497	TRANS LF SS N SM FMMT497
TR310	4AFMMT497	TRANS LF SS N SM FMMT497
TR311	4AFMMT497	TRANS LF SS N SM FMMT497
TR312	4AFMMT497	TRANS LF SS N SM FMMT497
TR313	4AFMMT497	TRANS LF SS N SM FMMT497
TR314	4AFMMT497	TRANS LF SS N SM FMMT497
TR315	4AFMMT497	TRANS LF SS N SM FMMT497
TR316	4AFMMT497	TRANS LF SS N SM FMMT497
TR317	4AFMMT497	TRANS LF SS N SM FMMT497
TR318	4CSAP15N	TRANS POWER NPN SAP15N
TR319	4CSAP15P	TRANS POWER PNP SAP15P
TR320	4AFMMT497	TRANS LF SS N SM FMMT497
TR321	4AFMMT597	TRANS LF SS P SM FMMT597
TR322	4AFMMT497	TRANS LF SS N SM FMMT497
TR400	4AFMMT597	TRANS LF SS P SM FMMT597
TR401	4AFMMT597	TRANS LF SS P SM FMMT597
TR402	4AFMMT597	TRANS LF SS P SM FMMT597
TR403	4AFMMT597	TRANS LF SS P SM FMMT597
TR404	4AFMMT597	TRANS LF SS P SM FMMT597
TR405	4AFMMT597	TRANS LF SS P SM FMMT597
TR406	4AFMMT597	TRANS LF SS P SM FMMT597
TR407	4AFMMT597	TRANS LF SS P SM FMMT597
TR408	4AFMMT597	TRANS LF SS P SM FMMT597
TR409	4AFMMT497	TRANS LF SS N SM FMMT497
TR410	4AFMMT497	TRANS LF SS N SM FMMT497
TR411	4AFMMT497	TRANS LF SS N SM FMMT497
TR412	4AFMMT497	TRANS LF SS N SM FMMT497
TR413	4AFMMT497	TRANS LF SS N SM FMMT497
TR414	4AFMMT497	TRANS LF SS N SM FMMT497
TR415	4AFMMT497	TRANS LF SS N SM FMMT497
TR416	4AFMMT497	TRANS LF SS N SM FMMT497
TR417	4AFMMT497	TRANS LF SS N SM FMMT497
TR418	4CSAP15N	TRANS POWER NPN SAP15N
TR419	4CSAP15P	TRANS POWER PNP SAP15P
TR420	4AFMMT497	TRANS LF SS N SM FMMT497
TR421	4AFMMT597	TRANS LF SS P SM FMMT597
TR422	4AFMMT497	TRANS LF SS N SM FMMT497
TX200	7A9301	TRANSFORMER 3VA 9V+9V TYPE 9301



DRAWING TITLE

A85 amplifier and PSU - top sheet

Circuit Diagram

23425

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

Notes:

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
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02_E035	JBR	4/2/2002	FUSE VALUES UPRATED TO T4A	4.0

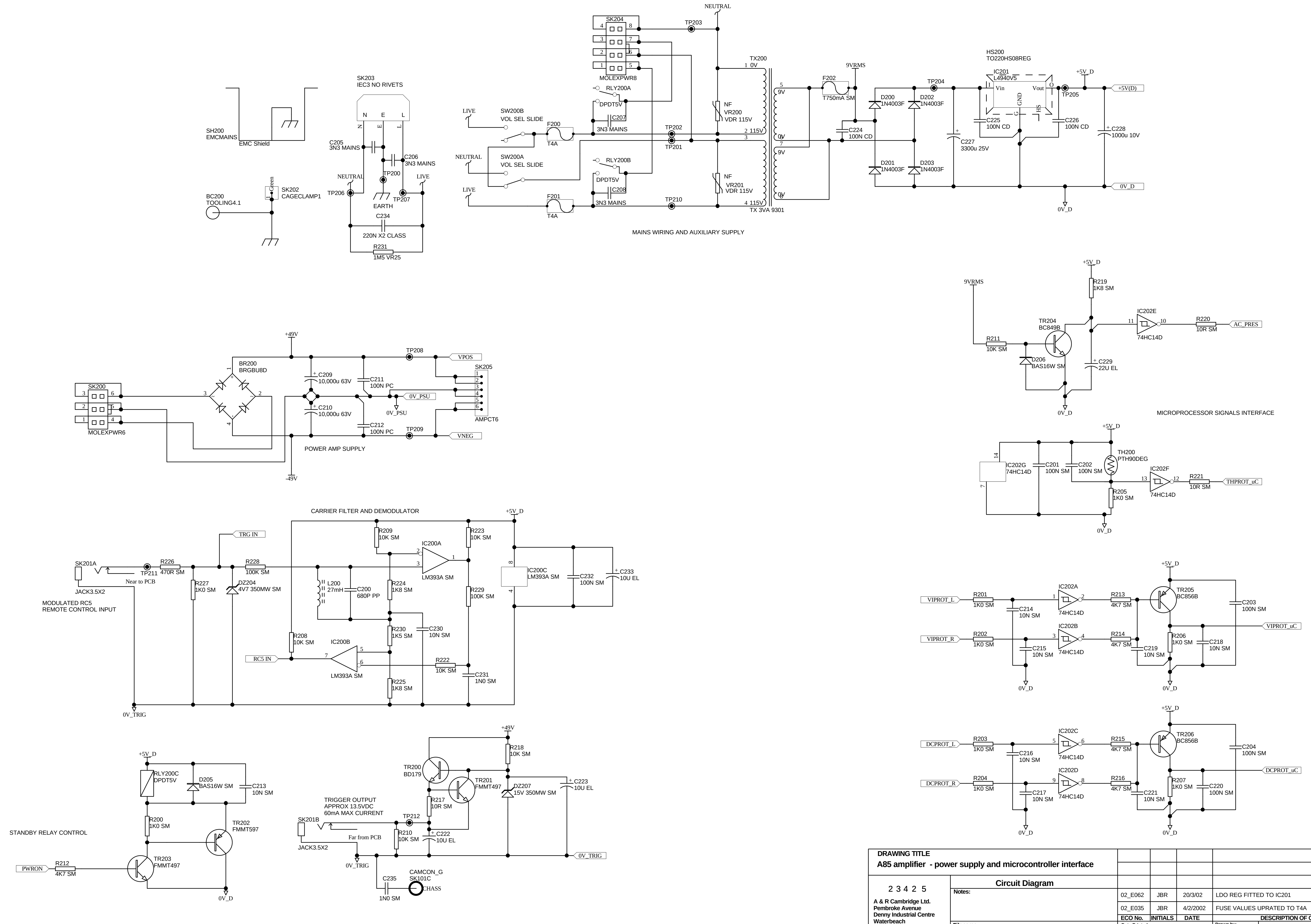
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Date Printed: 20-Mar-2002

Drawn by: J Reckless

Sheet 1 of 4

DRAWING NO. L882C1



DRAWING TITLE

A85 amplifier - power supply and microcontroller interface

Circuit Diagram

23425

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

Notes:

Filename
L882C2_4.1.SCH

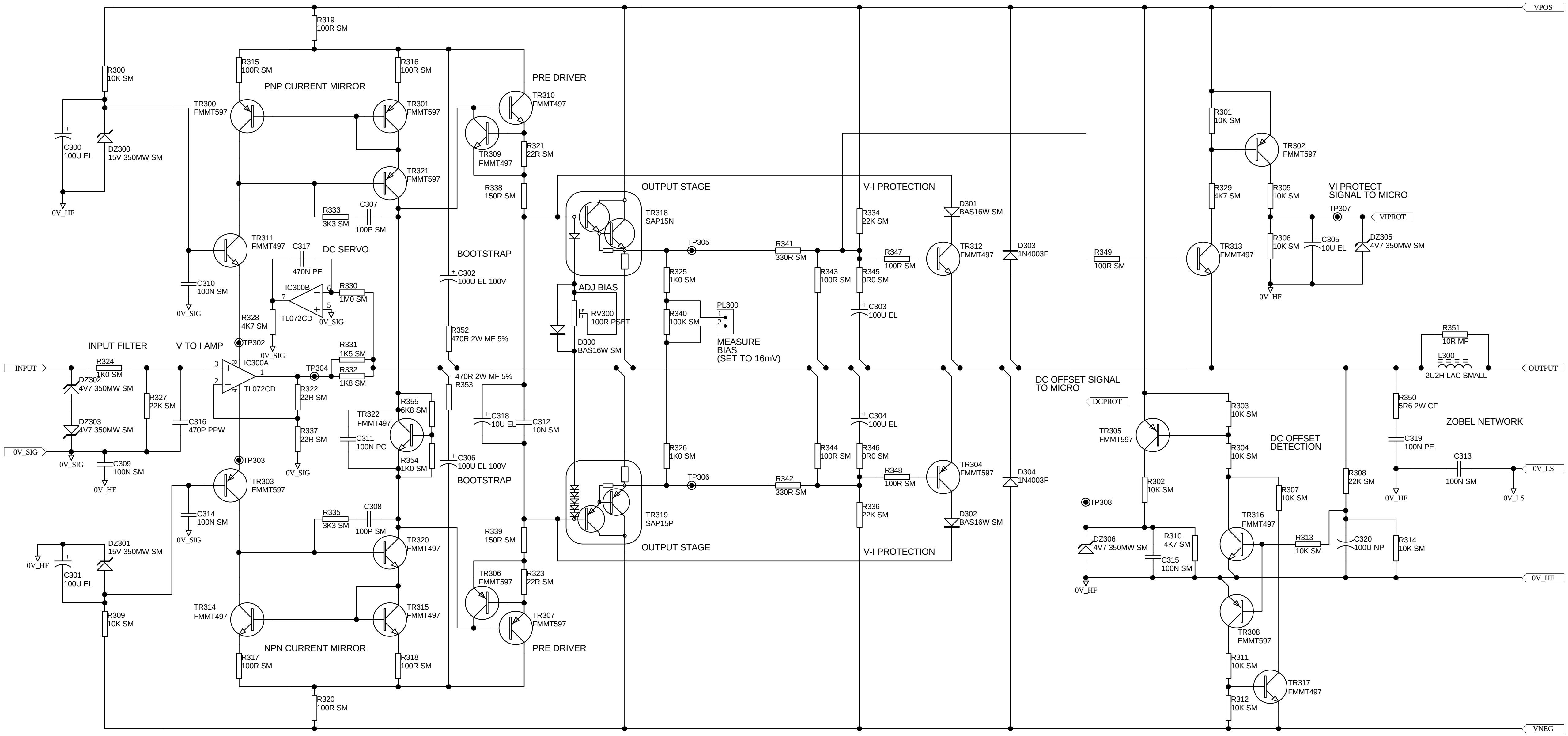
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02_E035	JBR	4/2/2002	FUSE VALUES UPRATED TO T4A	4.0

Date Printed 20-Mar-2002

Drawn by: J Reckless

Sheet 2 of 4

DRAWING NO. L882C2



DRAWING TITLE

A85 amplifier - power output stage left

Circuit Diagram

2 3 4 2 5

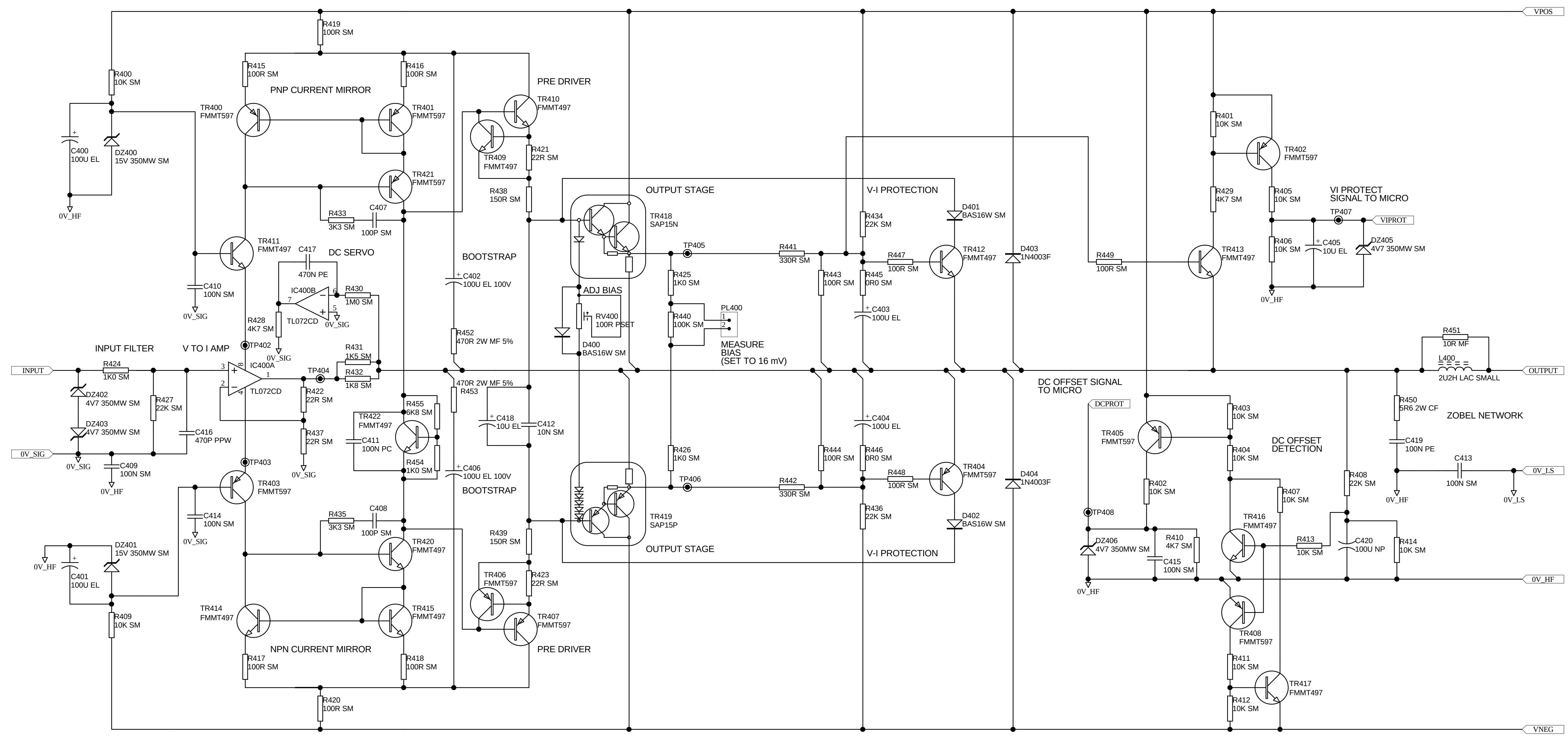
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Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

Notes:

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02_E035	JBR	4/2/2002	FUSE VALUES UPRATED TO T4A	4.0

Date Printed 20-Mar-2002 | Drawn by: J Reckless | Sheet 3 of 4 | DRAWING NO. L882C3



DRAWING TITLE
A85 amplifier - power output stage right
23425
Circuit Diagram
Notes:

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Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

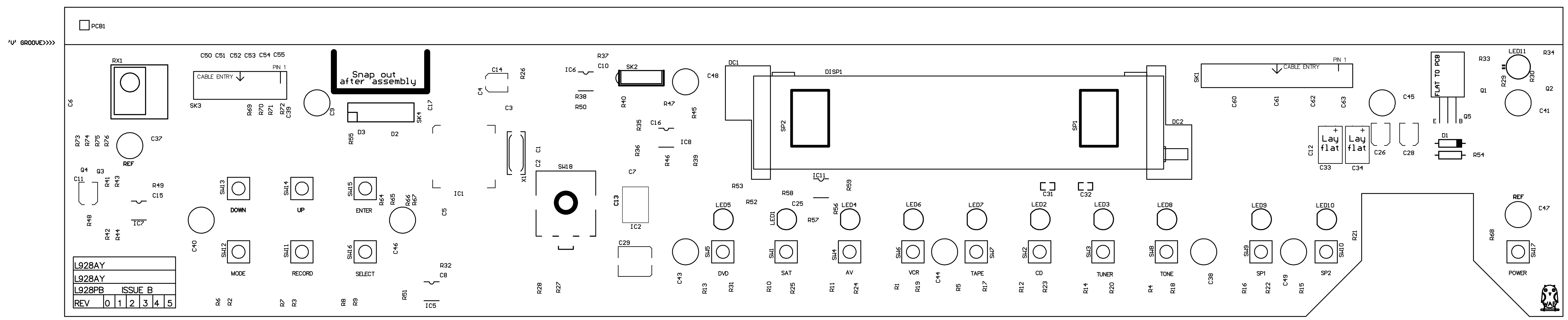
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02_E035	JBR	4/2/2002	FUSE VALUES UPRATED TO T4A	4.0

Filename	Date Printed	Drawn by:	Sheet	DRAWING NO.
L882C4_4.1.SCH	20-Mar-2002	J Reckless	Sheet 4 of 4	L882C4

Display Board L928

Contents

CAM Products 2000(TM): L928PB_B.GTO



MECHANICAL DATA
LAYER STACKUP
D>FILESYS:$RP>J:\Developm Top_Overlay ent_Projects\FMJ_amp_A32\Display & Microcontroller PCB\L928 A32 DISPLAY BOARD\L928AY_A$RN>L928AY_A.ddb$OP>$ON>L928PB_B.pcb$ID>25$ATTR>0$E>PCB$STF>

MATERIAL	FR4	NOTES:–
COPPER WEIGHT	1oz	1/ Manufacture in accordance with IPC–A–600F Class 1.
HOLE SIZES	FINISHED (SEE NOTE 2)	2/ Always use NC drill file as reference.
ROUTING	SEE NOTE 3	3/ All routing 2.0mm unless otherwise shown on drill drawing.
COPPER LAYERS	TWO	4/ Mark month/year of manufacture on ident layer.
MINIMUM WIDTH	8 MIL	5/ Scoring denoted by ->>>- on drill drawing.
MINIMUM GAP	6 MIL	
RESIST	GREEN	
IDENT	WHITE	GENERAL TOLERANCES
VENDOR CODES	SEE NOTE 4	PCB Dims. +/– 0.2mm
FINISH	SILVER	Routing +/– 0.1mm All holes +/–0.08mm
SCORING	SEE NOTE 5	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED

DRAWING TITLE **A32 DISPLAY BOARD**
Top Overlay

ARCAM

Filename: L928PB_B.pcb

DRAWING NO. **L928PB**

A & R Cambridge Ltd.
Pembroke Avenue
Waterbeach
Cambridge CB5 9PB

E.C.O. No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
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--	--	--	--	--
--	--	--	--	--
--	WAF	10/8/01	UPDATED PROTOTYPE	B
--	WAF	16/7/01	INITIAL PROTOTYPE	A

Contact Engineer: Cliff Lawrence | Contact Tel: +44 (0) 1223 203294 | Printed: 13–Aug–2001 | Sheet 2 of 10

L928 Display Board Parts List Issue B.3

Designator	Part	Description
C1	2C018	MLC 18P 50V X7R 10% SM
C2	2C018	MLC 18P 50V X7R 10% SM
C3	2C410	MLC 100N 50V X7R 10% SM
C4	2C410	MLC 100N 50V X7R 10% SM
C5	2C410	MLC 100N 50V X7R 10% SM
C6	2C410	MLC 100N 50V X7R 10% SM
C7	2C410	MLC 100N 50V X7R 10% SM
C8	2C410	MLC 100N 50V X7R 10% SM
C9	2C410	MLC 100N 50V X7R 10% SM
C10	2C410	MLC 100N 50V X7R 10% SM
C11	2M610	ELST 10U 50V SM
C12	2C410	MLC 100N 50V X7R 10% SM
C13	2C410	MLC 100N 50V X7R 10% SM
C14	2M610	ELST 10U 50V SM
C15	2C410	MLC 100N 50V X7R 10% SM
C16	2C410	MLC 100N 50V X7R 10% SM
C17	2C410	MLC 100N 50V X7R 10% SM
C25	2C410	MLC 100N 50V X7R 10% SM
C26	2M610	ELST 10U 50V SM
C28	2M610	ELST 10U 50V SM
C29	2M710	ELST 100U 25V SM
C31	2C010A	MLC 10P 50V NPO 10% SM
C32	2C010A	MLC 10P 50V NPO 10% SM
C33	2N722	ELST 220U 16V
C34	2N722	ELST 220U 16V
C37	2C210	MLC 1N0 50V X7R 10% SM
C38	2C210	MLC 1N0 50V X7R 10% SM
C39	2C210	MLC 1N0 50V X7R 10% SM
C40	2C210	MLC 1N0 50V X7R 10% SM
C41	2C210	MLC 1N0 50V X7R 10% SM
C43	2C210	MLC 1N0 50V X7R 10% SM
C44	2C210	MLC 1N0 50V X7R 10% SM
C45	2C210	MLC 1N0 50V X7R 10% SM
C46	2C210	MLC 1N0 50V X7R 10% SM
C47	2C210	MLC 1N0 50V X7R 10% SM
C48	2C210	MLC 1N0 50V X7R 10% SM
C49	2C210	MLC 1N0 50V X7R 10% SM
C50	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C51	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C52	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C53	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C54	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C55	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C60	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C61	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C62	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
C63	2W110X4	CAP PACK NPO 0612 4X100P 50V 5%
D1	3C13304	ZENER 33V BZX55C33V
D2	3AS16W	DIODE SS SM BAS16W
D3	3AS16W	DIODE SS SM BAS16W
DC1	E916PM	DISPLAY CRADLE E916PM
DC2	E916PM	DISPLAY CRADLE E916PM
DISP1	B1013	MN12818A VFD ITRON
IC1	5H3048	H8/3048 128K FLASH MICROCONTROLLER
IC2	5H1233A	IC MICRO RESET DS1233 SM
IC5	5G2402	IC CMOS EPROM 24C02 SM
IC6	5M393AD	IC COMPARATOR SM DUAL LM393A
IC7	5M393AD	IC COMPARATOR SM DUAL LM393A
IC8	5M393AD	IC COMPARATOR SM DUAL LM393A
IC11	5M8532	DUAL OUTPUT SINGLE SUPPLY AMP AD8532
LED1	3D001	LED GREEN 5MM
LED2	3D001	LED GREEN 5MM

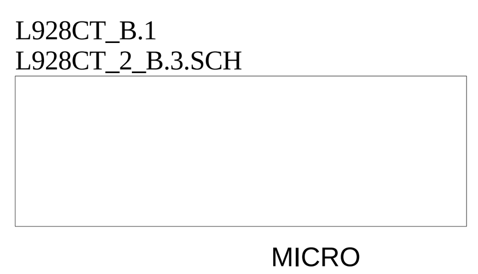
L928 Display Board Parts List Issue B.3

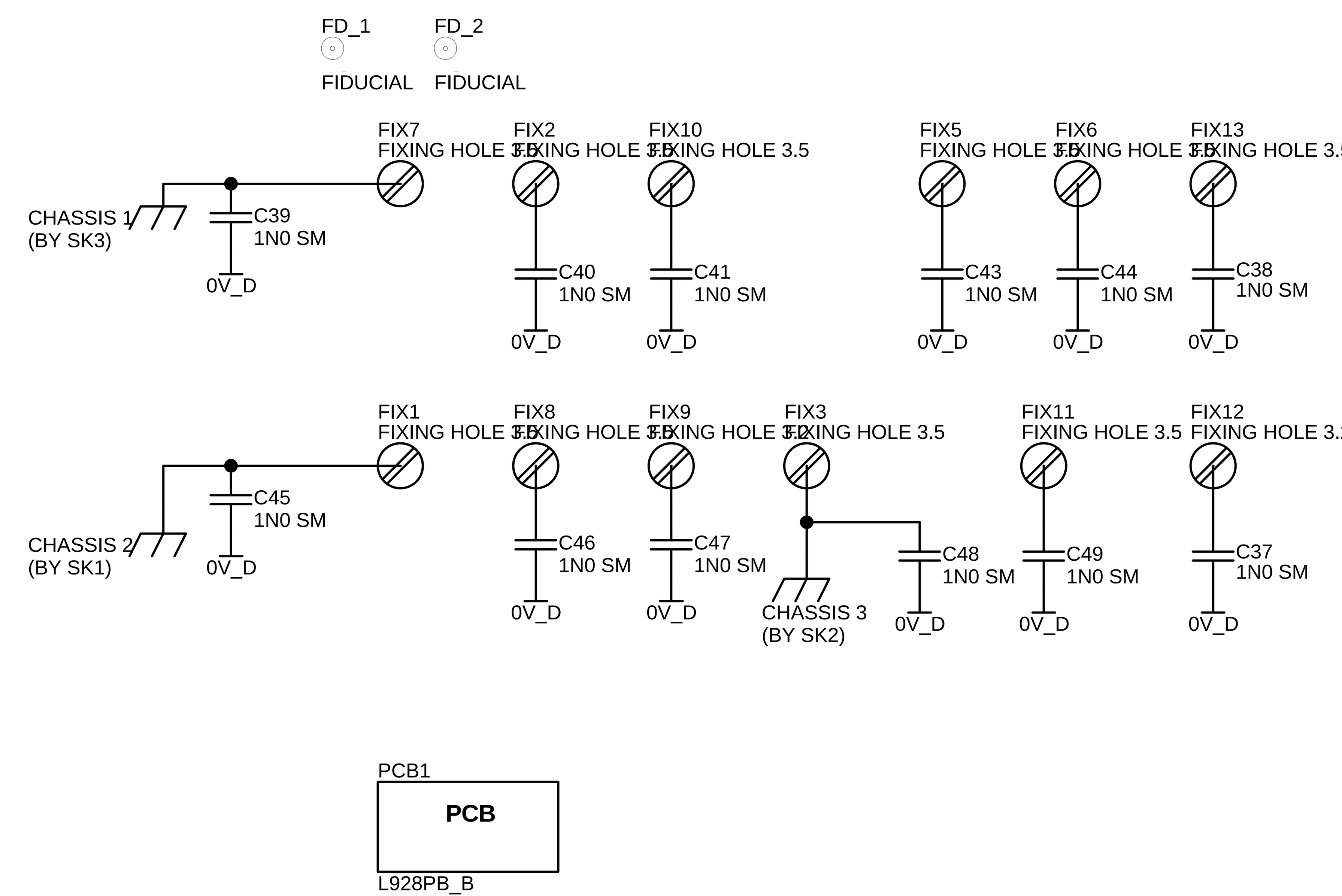
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LED3	3D001	LED GREEN 5MM
LED4	3D001	LED GREEN 5MM
LED5	3D001	LED GREEN 5MM
LED6	3D001	LED GREEN 5MM
LED7	3D001	LED GREEN 5MM
LED8	3D001	LED GREEN 5MM
LED9	3D001	LED GREEN 5MM
LED10	3D001	LED GREEN 5MM
LED11	3D006	LED RED/GREEN 3MM L-93WEGW
Q1	4A847	TRANS LF SS N SM BC847B
Q2	4A847	TRANS LF SS N SM BC847B
Q3	4A847	TRANS LF SS N SM BC847B
Q4	4A847	TRANS LF SS N SM BC847B
Q5	4B179	NPN TRANS MP BD179
R1	1A310	RES SM W4 2% 10K
R2	1A310	RES SM W4 2% 10K
R3	1A310	RES SM W4 2% 10K
R4	1A310	RES SM W4 2% 10K
R5	1A310	RES SM W4 2% 10K
R6	1A310	RES SM W4 2% 10K
R7	1A310	RES SM W4 2% 10K
R8	1A310	RES SM W4 2% 10K
R9	1A310	RES SM W4 2% 10K
R10	1A310	RES SM W4 2% 10K
R11	1A310	RES SM W4 2% 10K
R12	1A310	RES SM W4 2% 10K
R13	1A310	RES SM W4 2% 10K
R14	1A310	RES SM W4 2% 10K
R15	1A310	RES SM W4 2% 10K
R16	1A310	RES SM W4 2% 10K
R17	1A133	RES SM W4 2% 330R
R18	1A133	RES SM W4 2% 330R
R19	1A133	RES SM W4 2% 330R
R20	1A133	RES SM W4 2% 330R
R21	1A133	RES SM W4 2% 330R
R22	1A133	RES SM W4 2% 330R
R23	1A133	RES SM W4 2% 330R
R24	1A133	RES SM W4 2% 330R
R25	1A133	RES SM W4 2% 330R
R26	1A310	RES SM W4 2% 10K
R27	1A310	RES SM W4 2% 10K
R28	1A310	RES SM W4 2% 10K
R29	1A310	RES SM W4 2% 10K
R30	1A310	RES SM W4 2% 10K
R31	1A133	RES SM W4 2% 330R
R32	1A310	RES SM W4 2% 10K
R33	1A133	RES SM W4 2% 330R
R34	1A115	RES SM W4 2% 150R
R35	1A310	RES SM W4 2% 10K
R36	1A310	RES SM W4 2% 10K
R37	1A310	RES SM W4 2% 10K
R38	1A212	RES SM W4 2% 1K2
R39	1A222	RES SM W4 2% 2K2
R40	1A247	RES SM W4 2% 4K7
R41	1A410	RES SM W4 2% 100K
R42	1A410	RES SM W4 2% 100K
R43	1A410	RES SM W4 2% 100K
R44	1A410	RES SM W4 2% 100K
R45	1A310	RES SM W4 2% 10K
R46	1A212	RES SM W4 2% 1K2
R47	1A247	RES SM W4 2% 4K7
R48	1A000	RES SM W4 2% 0R0

L928 Display Board Parts List Issue B.3

Designator	Part	Description
R49	1A310	RES SM W4 2% 10K
R50	1A310	RES SM W4 2% 10K
R51	1A110	RES SM W4 1% 100R 1206
R52	1A110	RES SM W4 1% 100R 1206
R53	1A110	RES SM W4 1% 100R 1206
R54	1H233	RES MF W4 1% 3K3
R55	1A310	RES SM W4 2% 10K
R56	1A310	RES SM W4 2% 10K
R57	1A310	RES SM W4 2% 10K
R58	1A000	RES SM W4 2% 0R0
R59	1A000	RES SM W4 2% 0R0
R64	1A110	RES SM W4 1% 100R 1206
R65	1A110	RES SM W4 1% 100R 1206
R66	1A110	RES SM W4 1% 100R 1206
R67	1A110	RES SM W4 1% 100R 1206
R68	1A310	RES SM W4 2% 10K
R69	1A822	RES SM W4 1% 2R2 1206
R70	1A822	RES SM W4 1% 2R2 1206
R71	1A822	RES SM W4 1% 2R2 1206
R72	1A822	RES SM W4 1% 2R2 1206
R73	1A310	RES SM W4 2% 10K
R74	1A310	RES SM W4 2% 10K
R75	1A310	RES SM W4 2% 10K
R76	1A310	RES SM W4 2% 10K
RX1	B2107	REMOTE RX PIC-26043TM2 38KHZ
SK1	8K7014A	FFC 14W 2.54MM HOR PTH
SK2	8K2005	5-WAY AMP CT CONN
SK3	8K8022A	22-WAY FFC CONN HORIZ 1MM PTH
SK4	8K6315	14 WAY DIL HEADER HORIZ
SP1	F195	LED SPACER
SP2	F195	LED SPACER
SP3	F195	LED SPACER
SP4	F195	LED SPACER
SP5	F195	LED SPACER
SP6	F195	LED SPACER
SP7	F195	LED SPACER
SP8	F195	LED SPACER
SP9	F195	LED SPACER
SP10	F195	LED SPACER
SP101	F163	STICKY PAD S/A 10 X 15mm
SP102	F163	STICKY PAD S/A 10 X 15mm
SP103	E822AP	IR RX SUPPORT PAD
SP	E822AP	IR RX SUPPORT PAD
SW1	A1505	TACT SWITCH SM SDTM-610-NTR
SW2	A1505	TACT SWITCH SM SDTM-610-NTR
SW3	A1505	TACT SWITCH SM SDTM-610-NTR
SW4	A1505	TACT SWITCH SM SDTM-610-NTR
SW5	A1505	TACT SWITCH SM SDTM-610-NTR
SW6	A1505	TACT SWITCH SM SDTM-610-NTR
SW7	A1505	TACT SWITCH SM SDTM-610-NTR
SW8	A1505	TACT SWITCH SM SDTM-610-NTR
SW9	A1505	TACT SWITCH SM SDTM-610-NTR
SW10	A1505	TACT SWITCH SM SDTM-610-NTR
SW11	A1505	TACT SWITCH SM SDTM-610-NTR
SW12	A1505	TACT SWITCH SM SDTM-610-NTR
SW13	A1505	TACT SWITCH SM SDTM-610-NTR
SW14	A1505	TACT SWITCH SM SDTM-610-NTR
SW15	A1505	TACT SWITCH SM SDTM-610-NTR
SW16	A1505	TACT SWITCH SM SDTM-610-NTR
SW17	A1505	TACT SWITCH SM SDTM-610-NTR
SW18	A1211	EC16B2414
X1	7X040	XTAL 16MHZ SM GSX49-4

A32 FMJ DISPLAY PCB





please remove F163 sticky pads
they should not be on here

	WAF	26/9/01	STICKY PADS RENUMBERED	B.3
	JBR	10/9/01	PRE PRODUCTION RELEASE	B.2
	WAF	9/08/01	UPDATED PROTOTYPE	B.0
	CL	25/04/01	INITIAL PROTOTYPE	A.0
ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE

DRAWING TITLE
A32 FMJ AMP DISPLAY PCB

Circuit Diagram

2 3 4 2 5

Notes:

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

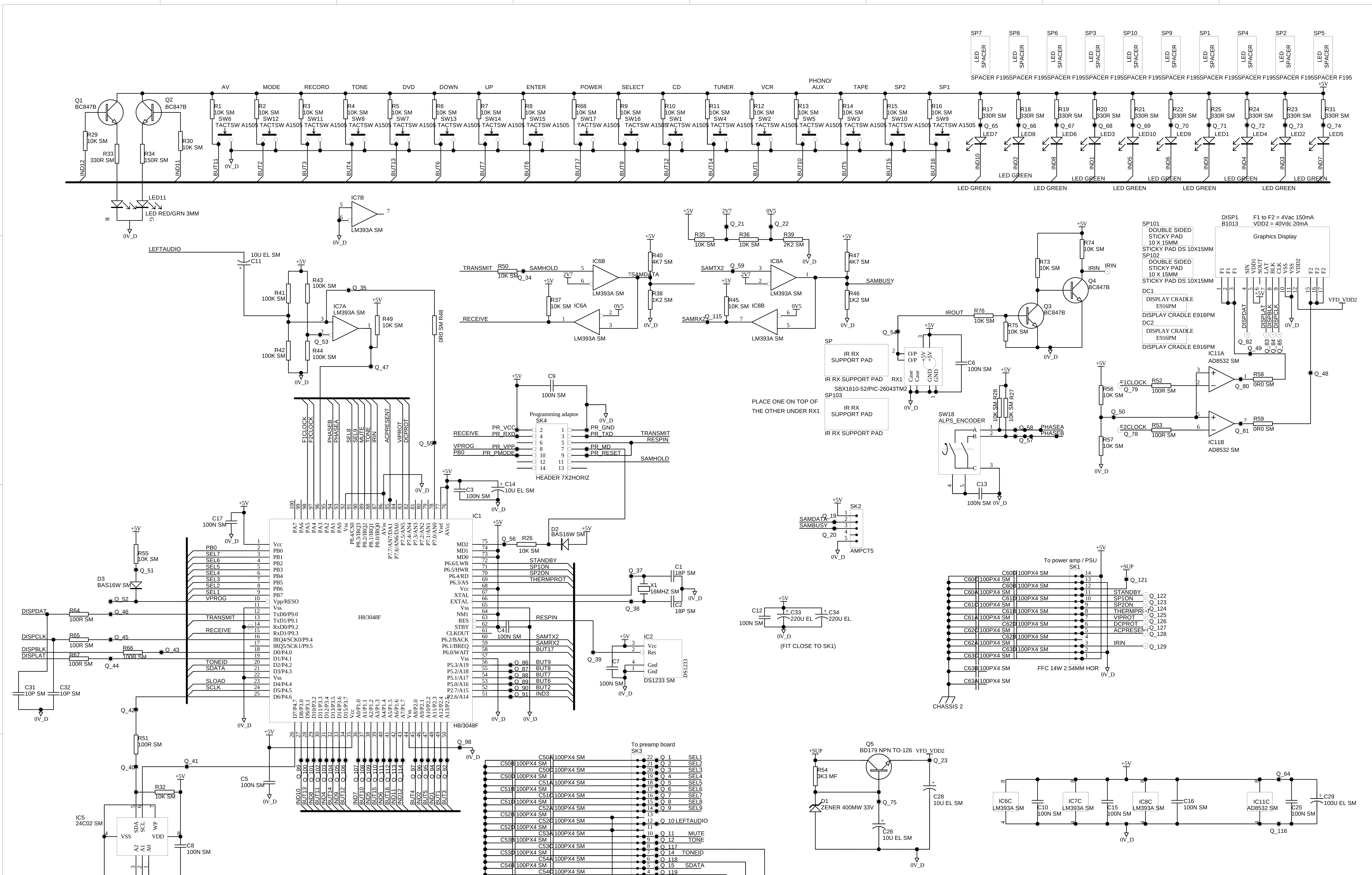
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Date Printed 10-Oct-2001

Drawn by: CL

Sheet 1 of 2

DRAWING NO. L928CT1



DRAWING TITLE **A32 FMJ AMP DISPLAY PCB**		WAF	26/9/01	STICKY PADS RENUMBERED		B.3
		JBR	10/9/01	PRE PRODUCTION RELEASE		B.2
Circuit Diagram		WAF	9/08/01	UPDATED PROTOTYPE		B.0
2 3 4 2 5 **A & R Cambridge Ltd.** **Pembroke Avenue** **Denny Industrial Centre** **Waterbeach** **Cambridge CB5 9PB**	Notes:	CL	25/04/01	INITIAL PROTOTYPE		A.0
		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
Filename J:\Released_Documents\Native_format_files\Protel_DDB\L928_B.3.Ddb - Documents\L928C	Date Printed 10-Oct-2001	Drawn by: CL	Sheet 2 of 2	DRAWING NO. L928CT2		

Preamplifier Board L937

Contents

Pre-amplifier circuit description
Refer to L937 circuit diagrams

The A32 preamplifier is a high-performance, DC coupled design with microprocessor control of input select, two independent tape loops, electronic volume control, tone bypass and electronic tone control.

It features a discrete power supply and low-noise linear circuitry to obtain very good distortion and noise performance, suitable for high quality source material such as CD or DVD-A.

Input switching

Each of the inputs has a pair of diodes to the ±15V rails to prevent static spikes from causing damage to the CMOS multiplexers. In addition, there is a simple resistor-capacitor filter with a corner frequency of approximately 340kHz to remove any unwanted high frequency interference from the signal. This uses high-quality polypropylene capacitors for best performance.

Z104 and Z105 are the main input select multiplexers, which are configured in a 'virtual earth' unity gain arrangement with Z115 and Z116. This arrangement is slightly lower distortion than the 'normal' one, at the cost of a slightly higher noise floor. It is an inverting configuration, which is restored to correct polarity by the inverting electronic volume control which follows.

Z115B and Z116B are integrating servos, which take out any DC from the input signal before the following stages. The servos are 2-pole, with a passive 2nd pole being formed by R180 and C147 (for the left channel) to remove broadband noise from the output of the servo and improve speed of response.

Z100 thru Z103 are the input selectors for the 2 tape loops. These are normal non-inverting selectors which are buffered before being passed on to the phono sockets.

Z109A output is decoupled by R108 which is included in the feedback path. Local high frequency feedback occurs around C108 to allow the tape loop output to be very low impedance, whilst being stable into a capacitive load such as may be presented by a screened interconnect cable. This is the same for all tape outputs.

Z106 is configured as a double pole changeover switch, used to select the tone controls. The tone controls are bypassed when not required so that the noise and distortion can be minimised.

Tone control circuit

The tone control circuit is a non-inverting one, using a gyrated 'bell' filter for the bass and a simple shelving filter for the treble.

Left channel description

The input is attenuated by 6dB and biased to a voltage of +2.5V DC by C111, R113, R112, R110, R111 and C110. This is so the signals fall within the 0 - 5VDC required by the digital potentiometer Z108.

Z111B and its associated components form an active equivalent of a series resonant LCR circuit. This has an impedance minimum of 5.4k˜ at around 80Hz with Q=0.7 The reason the bass is done as a band-boost filter rather than a shelving filter is so that you can boost the 'real' bass without causing lots of sub-audio loudspeaker cone excursion which wastes power and may damage the drive units.

The digital pots Z108D and Z108A control the bass and treble respectively. This is done by moving the wiper connected to the frequency-sensitive impedance between the non-inverting and inverting terminals of Z112A, effectively changing the ratio of feedback boost and feed-forward attenuation of the circuit at the desired frequencies, thus providing a EQ gain control that is symmetrical on a logarithmic scale, with the use of a linear pot.

Z112B provides the 6dB of gain necessary to bring the nominal signal level back to unity. C116 and C117 remove the 2.5VDC offset from the output, to prevent clunks when the tone controls are activated.

Z108 is controlled by a simple 3-wire serial interface from the microprocessor. Each of the digital lines has its own ground return to minimise electromagnetic interference. They are connected together only at the GND pin of the IC.

Volume control

Z107 is a VSDVC electronic volume control IC. It works, in conjunction with an external op-amp, by varying the feed-forward and feedback resistors in an inverting gain configuration. In this way, it can allow output signal swings of up to 22Vpp whilst operating from a single +5VDC power supply. Also, it allows the user the choice of external circuitry to fine-tune the performance. The gain is controlled from the microprocessor via a 3-wire serial interface. The analogue supply rail is derived from the local +5V via R185 and C156 // C157.

Z117 is the output op-amp. Its outputs are decoupled via R186, R187, C158 and C159 so that it has a low output impedance but can drive cable capacitance without oscillation. R186 and R187 are included in the audio frequency feedback loop to reduce output impedance when driving 'difficult' cables.

RLY100 is a mute relay which shunts the preamp output to ground. This is to prevent thumps and squeals when the units is powered up or down.

Power supply

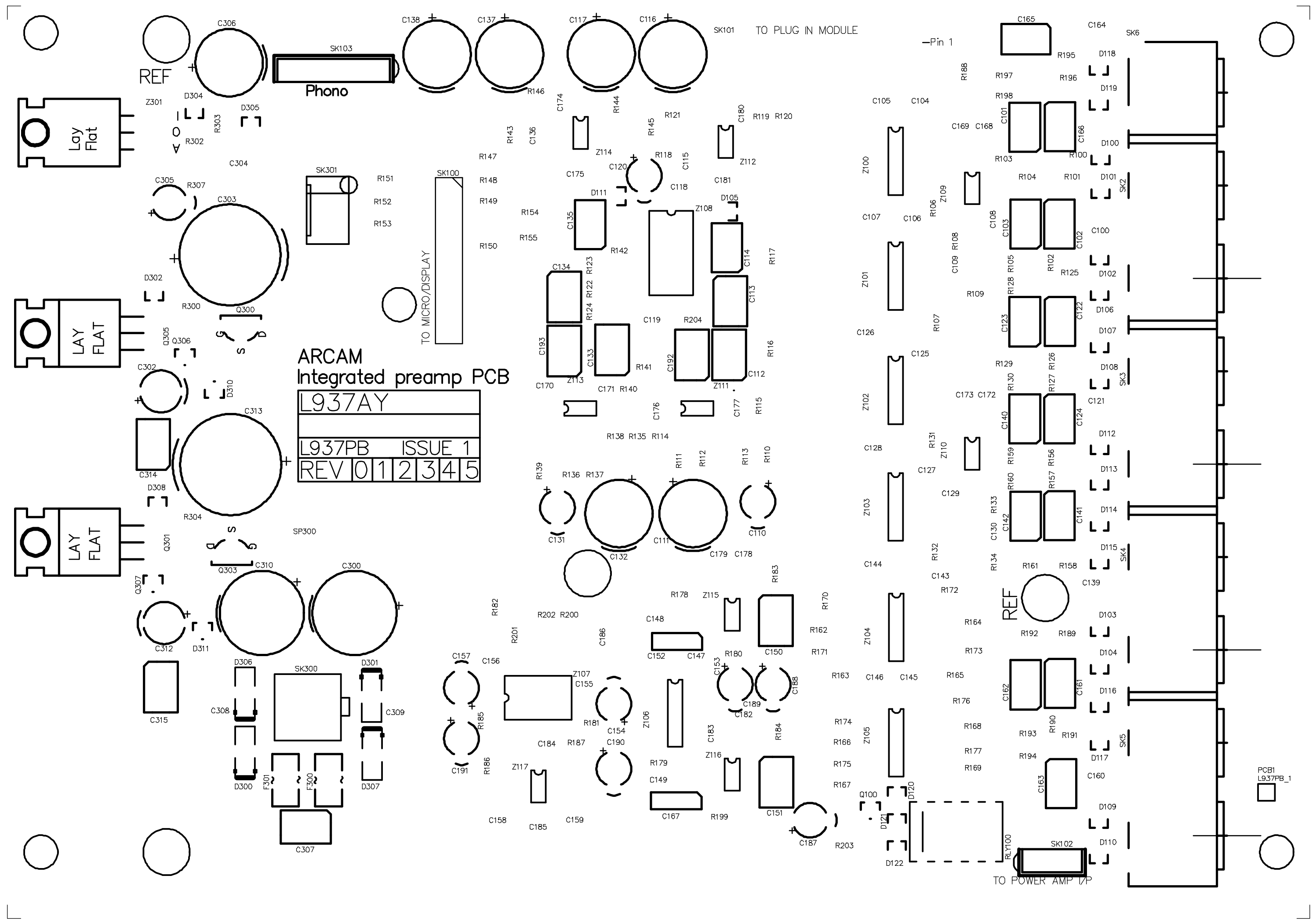
The transformer winding is connected to SK300. The voltage is rectified and smoothed by D300, D301, D306, D307 and C300, C310. The unregulated voltage should be around ±27VDC. F300 and F301 are secondary fuses, as the low power preamp winding would not blow the primary fuses if short circuited.

The voltage regulators are discrete compound emitter followers. I will describe the +15V supply as the negative is essentially an exact mirror image.

Q300 and R300 act as a constant current source, supplying around 7mA into D310. C302 and C314 reduce ripple and broadband noise on the zener diode. Q305 and Q306 form a complementary Darlington NPN transistor which is configured as an emitter follower, producing the +15VDC at its output. C303 is to provide bulk charge storage and to reduce the AC output impedance of the power supply. D302 prevents reverse bias of the supply during power down.

Z301 is a conventional LM317 type circuit to drop the +15V rail down to +5V for the tone and volume control circuits.

Star point SP300 explicitly connects the differently named ground nets together at one point, to minimise hum.



MECHANICAL DATA	
LAYER STACKUP	
L937PB_1.GTO	Top Overlay

MATERIAL	FR4	NOTES:–
COPPER WEIGHT	1oz	1/ Manufacture in accordance with IPC–A–600F Class 1.
HOLE SIZES	FINISHED (SEE NOTE 2)	2/ Always use NC drill file as reference.
ROUTING	SEE NOTE 3	3/ All routing 2.0mm unless otherwise shown on drill drawing.
COPPER LAYERS	TWO	4/ Mark month/year of manufacture on ident layer.
MINIMUM WIDTH	10 mils	5/ Scoring denoted by ->>>- on drill drawing (1/3 top and bottom).
MINIMUM GAP	10 mils	
RESIST	GREEN	
IDENT	WHITE	GENERAL TOLERANCES
VENDOR CODES	SEE NOTE 4	PCB Dims. +/– 0.2mm
FINISH	SILVER	Routing +/– 0.1mm All holes +/–0.08mm
SCORING	SEE NOTE 5	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED

DRAWING TITLE **Integrated preamp PCB** Top Overlay	--	--	--	--		--
	--	--	--	--		--
ARCAM — Filename: L937PB_1.pcb	--	--	--	--		--
DRAWING NO.	--	--	--	--		--
A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB — L937PB_1	01_1142	JBR	14/8/01	First production release		1
	E.C.O. No.	INITIALS	DATE	DESCRIPTION OF CHANGE		ISSUE
Contact Engineer: Jonny Reckless	Contact Tel: +44 (0) 1223 203200			Printed: 20–Aug–2001	Sheet 2	

L937 Preamplifier Board Parts List Issue 1.0

Designator	Part	Description
C100	2C210	MLC 1N0 50V X7R 10% SM
C101	2D147W	WIMA FKP2 470P 63V CAP
C102	2D147W	WIMA FKP2 470P 63V CAP
C103	2D147W	WIMA FKP2 470P 63V CAP
C104	2C410	MLC 100N 50V X7R 10% SM
C105	2C410	MLC 100N 50V X7R 10% SM
C106	2C410	MLC 100N 50V X7R 10% SM
C107	2C410	MLC 100N 50V X7R 10% SM
C108	2C110	MLC 100P 50V NPO 5% SM
C109	2C110	MLC 100P 50V NPO 5% SM
C110	2N710	ELST 100U 25V
C111	2P610CC	ELEC 10U 50V CERAFINE
C112	2K447	PEST 470N 63V 10%
C113	2K447	PEST 470N 63V 10%
C114	2D222W	WIMA FKP2 2N2 63V CAP
C115	2C022	MLC 22P 50V NPO 5% SM
C116	2P610CC	ELEC 10U 50V CERAFINE
C117	2P610CC	ELEC 10U 50V CERAFINE
C118	2C410	MLC 100N 50V X7R 10% SM
C119	2C310	MLC 10N 50V X7R 10% SM
C120	2N610	ELST 10U 50V
C121	2C210	MLC 1N0 50V X7R 10% SM
C122	2D147W	WIMA FKP2 470P 63V CAP
C123	2D147W	WIMA FKP2 470P 63V CAP
C124	2D147W	WIMA FKP2 470P 63V CAP
C125	2C410	MLC 100N 50V X7R 10% SM
C126	2C410	MLC 100N 50V X7R 10% SM
C127	2C410	MLC 100N 50V X7R 10% SM
C128	2C410	MLC 100N 50V X7R 10% SM
C129	2C110	MLC 100P 50V NPO 5% SM
C130	2C110	MLC 100P 50V NPO 5% SM
C131	2N710	ELST 100U 25V
C132	2P610CC	ELEC 10U 50V CERAFINE
C133	2K447	PEST 470N 63V 10%
C134	2K447	PEST 470N 63V 10%
C135	2D222W	WIMA FKP2 2N2 63V CAP
C136	2C022	MLC 22P 50V NPO 5% SM
C137	2P610CC	ELEC 10U 50V CERAFINE
C138	2P610CC	ELEC 10U 50V CERAFINE
C139	2C210	MLC 1N0 50V X7R 10% SM
C140	2D147W	WIMA FKP2 470P 63V CAP
C141	2D147W	WIMA FKP2 470P 63V CAP
C142	2D147W	WIMA FKP2 470P 63V CAP
C143	2C410	MLC 100N 50V X7R 10% SM
C144	2C410	MLC 100N 50V X7R 10% SM
C145	2C410	MLC 100N 50V X7R 10% SM
C146	2C410	MLC 100N 50V X7R 10% SM
C147	2K410	PEST 100N 63V 10%
C148	2C022	MLC 22P 50V NPO 5% SM
C149	2C022	MLC 22P 50V NPO 5% SM
C150	2K447	PEST 470N 63V 10%
C151	2K447	PEST 470N 63V 10%
C152	2C410	MLC 100N 50V X7R 10% SM
C153	2C410	MLC 100N 50V X7R 10% SM
C154	2N610	ELST 10U 50V
C155	2C410	MLC 100N 50V X7R 10% SM
C156	2C410	MLC 100N 50V X7R 10% SM
C157	2N710	ELST 100U 25V
C158	2C022	MLC 22P 50V NPO 5% SM
C159	2C022	MLC 22P 50V NPO 5% SM
C160	2C210	MLC 1N0 50V X7R 10% SM
C161	2D147W	WIMA FKP2 470P 63V CAP

L937 Preamplifier Board Parts List Issue 1.0

Designator	Part	Description
C162	2D147W	WIMA FKP2 470P 63V CAP
C163	2D147W	WIMA FKP2 470P 63V CAP
C164	2C210	MLC 1N0 50V X7R 10% SM
C165	2D147W	WIMA FKP2 470P 63V CAP
C166	2D147W	WIMA FKP2 470P 63V CAP
C167	2K410	PEST 100N 63V 10%
C168	2C410	MLC 100N 50V X7R 10% SM
C169	2C410	MLC 100N 50V X7R 10% SM
C170	2C410	MLC 100N 50V X7R 10% SM
C171	2C410	MLC 100N 50V X7R 10% SM
C172	2C410	MLC 100N 50V X7R 10% SM
C173	2C410	MLC 100N 50V X7R 10% SM
C174	2C410	MLC 100N 50V X7R 10% SM
C175	2C410	MLC 100N 50V X7R 10% SM
C176	2C410	MLC 100N 50V X7R 10% SM
C177	2C410	MLC 100N 50V X7R 10% SM
C178	2C410	MLC 100N 50V X7R 10% SM
C179	2C410	MLC 100N 50V X7R 10% SM
C180	2C410	MLC 100N 50V X7R 10% SM
C181	2C410	MLC 100N 50V X7R 10% SM
C182	2C410	MLC 100N 50V X7R 10% SM
C183	2C410	MLC 100N 50V X7R 10% SM
C184	2C410	MLC 100N 50V X7R 10% SM
C185	2C410	MLC 100N 50V X7R 10% SM
C186	2C410	MLC 100N 50V X7R 10% SM
C187	2N610	ELST 10U 50V
C188	2N610	ELST 10U 50V
C189	2N610	ELST 10U 50V
C190	2N610	ELST 10U 50V
C191	2N610	ELST 10U 50V
C192	2K447	PEST 470N 63V 10%
C193	2K447	PEST 470N 63V 10%
C300	2N810C	ELST 1M0 35V
C302	2N722	ELST 220U 16V
C303	2N833	ELST 3M3 25V
C304	2C410	MLC 100N 50V X7R 10% SM
C305	2N610	ELST 10U 50V
C306	2N747	ELST 470U 25V RA
C307	2K447	PEST 470N 63V 10%
C308	2C410	MLC 100N 50V X7R 10% SM
C309	2C410	MLC 100N 50V X7R 10% SM
C310	2N810C	ELST 1M0 35V
C312	2N722	ELST 220U 16V
C313	2N833	ELST 3M3 25V
C314	2D210	PPRO 1N0 5% 63V RA
C315	2D210	PPRO 1N0 5% 63V RA
D100	3AV99W	DIODE SS SM BAV99W
D101	3AV99W	DIODE SS SM BAV99W
D102	3AV99W	DIODE SS SM BAV99W
D103	3AV99W	DIODE SS SM BAV99W
D104	3AV99W	DIODE SS SM BAV99W
D105	3AV99W	DIODE SS SM BAV99W
D106	3AV99W	DIODE SS SM BAV99W
D107	3AV99W	DIODE SS SM BAV99W
D108	3AV99W	DIODE SS SM BAV99W
D109	3AV99W	DIODE SS SM BAV99W
D110	3AV99W	DIODE SS SM BAV99W
D111	3AV99W	DIODE SS SM BAV99W
D112	3AV99W	DIODE SS SM BAV99W
D113	3AV99W	DIODE SS SM BAV99W
D114	3AV99W	DIODE SS SM BAV99W
D115	3AV99W	DIODE SS SM BAV99W

L937 Preamplifier Board Parts List Issue 1.0

Designator	Part	Description
D116	3AV99W	DIODE SS SM BAV99W
D117	3AV99W	DIODE SS SM BAV99W
D118	3AV99W	DIODE SS SM BAV99W
D119	3AV99W	DIODE SS SM BAV99W
D120	3AS16W	DIODE SS SM BAS16W
D121	3AV99W	DIODE SS SM BAV99W
D122	3AV99W	DIODE SS SM BAV99W
D300	3BS1D	RECT S1D 1A 200V SM
D301	3BS1D	RECT S1D 1A 200V SM
D302	3AS16W	DIODE SS SM BAS16W
D304	3AS16W	DIODE SS SM BAS16W
D305	3AS16W	DIODE SS SM BAS16W
D306	3BS1D	RECT S1D 1A 200V SM
D307	3BS1D	RECT S1D 1A 200V SM
D308	3AS16W	DIODE SS SM BAS16W
D310	3CW315V	ZENER 15V OW35 SM SOT23
D311	3CW315V	ZENER 15V OW35 SM SOT23
F300	C3751	FUSE R452 T750mA
F301	C3751	FUSE R452 T750mA
PCB1	L937PB_1	PRINTED CIRCUIT BOARD
Q100	4A849B	TRANS LF SS N SM BC849B
Q300	4J112	TRANS JFET N J112
Q301	4B5248	TRANS AUDIO DRIVER N 2SC5248
Q303	4J112	TRANS JFET N J112
Q305	4B1964	TRANS AUDIO DRIVER P 2SA1964
Q306	4A846B	TRANS LF SS N SM BC846B
Q307	4A856B	TRANS LF SS P SM BC856B
R100	1A210	RES SM W4 1% 1K0 1206
R101	1A210	RES SM W4 1% 1K0 1206
R102	1A210	RES SM W4 1% 1K0 1206
R103	1A410	RES SM W4 1% 100K 1206
R104	1A410	RES SM W4 1% 100K 1206
R105	1A410	RES SM W4 1% 100K 1206
R106	1A510	RES SM W4 1% 1M0 1206
R107	1A510	RES SM W4 1% 1M0 1206
R108	1A047	RES SM W4 1% 47R 1206
R109	1A047	RES SM W4 1% 47R 1206
R110	1A222	RES SM W4 1% 2K2 1206
R111	1A222	RES SM W4 1% 2K2 1206
R112	1A322	RES SM W4 1% 22K 1206
R113	1A322	RES SM W4 1% 22K 1206
R114	1A322	RES SM W4 1% 22K 1206
R115	1A227	RES SM W4 1% 2K7 1206
R116	1A227	RES SM W4 1% 2K7 1206
R117	1A256	RES SM W4 1% 5K6 1206
R118	1A322	RES SM W4 1% 22K 1206
R119	1A322	RES SM W4 1% 22K 1206
R120	1A322	RES SM W4 1% 22K 1206
R121	1A322	RES SM W4 1% 22K 1206
R122	1A822	RES SM W4 1% 2R2 1206
R123	1A822	RES SM W4 1% 2R2 1206
R124	1A822	RES SM W4 1% 2R2 1206
R125	1A210	RES SM W4 1% 1K0 1206
R126	1A210	RES SM W4 1% 1K0 1206
R127	1A210	RES SM W4 1% 1K0 1206
R128	1A410	RES SM W4 1% 100K 1206
R129	1A410	RES SM W4 1% 100K 1206
R130	1A410	RES SM W4 1% 100K 1206
R131	1A510	RES SM W4 1% 1M0 1206
R132	1A510	RES SM W4 1% 1M0 1206
R133	1A047	RES SM W4 1% 47R 1206
R134	1A047	RES SM W4 1% 47R 1206

L937 Preamplifier Board Parts List Issue 1.0

Designator	Part	Description
R135	1A222	RES SM W4 1% 2K2 1206
R136	1A222	RES SM W4 1% 2K2 1206
R137	1A322	RES SM W4 1% 22K 1206
R138	1A322	RES SM W4 1% 22K 1206
R139	1A322	RES SM W4 1% 22K 1206
R140	1A227	RES SM W4 1% 2K7 1206
R141	1A227	RES SM W4 1% 2K7 1206
R142	1A256	RES SM W4 1% 5K6 1206
R143	1A322	RES SM W4 1% 22K 1206
R144	1A322	RES SM W4 1% 22K 1206
R145	1A322	RES SM W4 1% 22K 1206
R146	1A322	RES SM W4 1% 22K 1206
R147	1A322	RES SM W4 1% 22K 1206
R148	1A322	RES SM W4 1% 22K 1206
R149	1A322	RES SM W4 1% 22K 1206
R150	1A322	RES SM W4 1% 22K 1206
R151	1A322	RES SM W4 1% 22K 1206
R152	1A322	RES SM W4 1% 22K 1206
R153	1A322	RES SM W4 1% 22K 1206
R154	1A322	RES SM W4 1% 22K 1206
R155	1A322	RES SM W4 1% 22K 1206
R156	1A210	RES SM W4 1% 1K0 1206
R157	1A210	RES SM W4 1% 1K0 1206
R158	1A210	RES SM W4 1% 1K0 1206
R159	1A410	RES SM W4 1% 100K 1206
R160	1A410	RES SM W4 1% 100K 1206
R161	1A410	RES SM W4 1% 100K 1206
R162	1A322	RES SM W4 1% 22K 1206
R163	1A322	RES SM W4 1% 22K 1206
R164	1A322	RES SM W4 1% 22K 1206
R165	1A322	RES SM W4 1% 22K 1206
R166	1A322	RES SM W4 1% 22K 1206
R167	1A322	RES SM W4 1% 22K 1206
R168	1A322	RES SM W4 1% 22K 1206
R169	1A322	RES SM W4 1% 22K 1206
R170	1A322	RES SM W4 1% 22K 1206
R171	1A322	RES SM W4 1% 22K 1206
R172	1A322	RES SM W4 1% 22K 1206
R173	1A322	RES SM W4 1% 22K 1206
R174	1A322	RES SM W4 1% 22K 1206
R175	1A322	RES SM W4 1% 22K 1206
R176	1A322	RES SM W4 1% 22K 1206
R177	1A322	RES SM W4 1% 22K 1206
R178	1A322	RES SM W4 1% 22K 1206
R179	1A322	RES SM W4 1% 22K 1206
R180	1A410	RES SM W4 1% 100K 1206
R182	1A110	RES SM W4 1% 100R 1206
R183	1A510	RES SM W4 1% 1M0 1206
R184	1A510	RES SM W4 1% 1M0 1206
R185	1A022	RES SM W4 1% 22R 1206
R186	1A047	RES SM W4 1% 47R 1206
R187	1A047	RES SM W4 1% 47R 1206
R188	1A310	RES SM W4 1% 10K 1206
R189	1A210	RES SM W4 1% 1K0 1206
R190	1A210	RES SM W4 1% 1K0 1206
R191	1A210	RES SM W4 1% 1K0 1206
R192	1A410	RES SM W4 1% 100K 1206
R193	1A410	RES SM W4 1% 100K 1206
R194	1A410	RES SM W4 1% 100K 1206
R195	1A210	RES SM W4 1% 1K0 1206
R196	1A210	RES SM W4 1% 1K0 1206
R197	1A410	RES SM W4 1% 100K 1206

L937 Preamplifier Board Parts List Issue 1.0

Designator	Part	Description
R198	1A410	RES SM W4 1% 100K 1206
R199	1A410	RES SM W4 1% 100K 1206
R200	1A822	RES SM W4 1% 2R2 1206
R201	1A822	RES SM W4 1% 2R2 1206
R202	1A822	RES SM W4 1% 2R2 1206
R203	1A247	RES SM W4 1% 4K7 1206
R204	1A310	RES SM W4 1% 10K 1206
R300	1A133	RES SM W4 1% 330R 1206
R302	1A212	RES SM W4 1% 1K2 1206
R303	1A147	RES SM W4 1% 470R 1206
R304	1A133	RES SM W4 1% 330R 1206
R307	1A122	RES SM W4 1% 220R 1206
RLY100	A216	RELAY DPDT 5V SM NEC EB2-5NU
SK2	8D225	PHONO SKT 4-WAY EMC GOLD
SK3	8D225	PHONO SKT 4-WAY EMC GOLD
SK4	8D225	PHONO SKT 4-WAY EMC GOLD
SK5	8D225	PHONO SKT 4-WAY EMC GOLD
SK6	8D226	PHONO SKT 2-WAY EMC GOLD
SK100	8K8022B	Connector 1mm vertical 22way Molex 52806-2210
SK101	8K8330	30-WAY FFC VERT CONN SM 1MM
SK102	8K2404	4-WAY AMP CT CONN
SK103	8K2408	8-WAY AMP CT CONN
SK300	8K2304	MOLEX MINI FIT HCS 4 WAY
SK301	8K6604	4-WAY FR LOCK CONN
Z100	5S408DY	IC 8 TO 1 MUX DG408DY SO16
Z101	5S408DY	IC 8 TO 1 MUX DG408DY SO16
Z102	5S408DY	IC 8 TO 1 MUX DG408DY SO16
Z103	5S408DY	IC 8 TO 1 MUX DG408DY SO16
Z104	5S408DY	IC 8 TO 1 MUX DG408DY SO16
Z105	5S408DY	IC 8 TO 1 MUX DG408DY SO16
Z106	5S413DY	IC QUAD SPST CMOS SW SO16
Z107	5AVSDVC	IC AUDIO DIGITAL VOL SM
Z108	5A1844	IC DS1844S-010
Z109	5B072D	IC AUDIO SM DUAL TL072
Z110	5B072D	IC AUDIO SM DUAL TL072
Z111	5B072D	IC AUDIO SM DUAL TL072
Z112	5B072D	IC AUDIO SM DUAL TL072
Z113	5B072D	IC AUDIO SM DUAL TL072
Z114	5B072D	IC AUDIO SM DUAL TL072
Z115	5B2134	IC OPAMP DUAL SM OPA2134PA
Z116	5B2134	IC OPAMP DUAL SM OPA2134PA
Z117	5B2134	IC OPAMP DUAL SM OPA2134PA
Z301	5D317T	IC VREG POS LM317T

Main signal path
L937C2_1.1.SCH

Power supply
L937C3_1.1.SCH

PCB1
PCB
L937PB_1

USE EXCLUDE NF WHEN USING RUNOUT SHEET PROGRAM

DRAWING TITLE

Integrated amplifier preamp

Circuit Diagram

Notes:

2 3 4 2 5

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_E014	JBR	28/11/01	Fuses uprated to 2A	1.1
01_1142	JBR	14/8/01	First production release	1.0

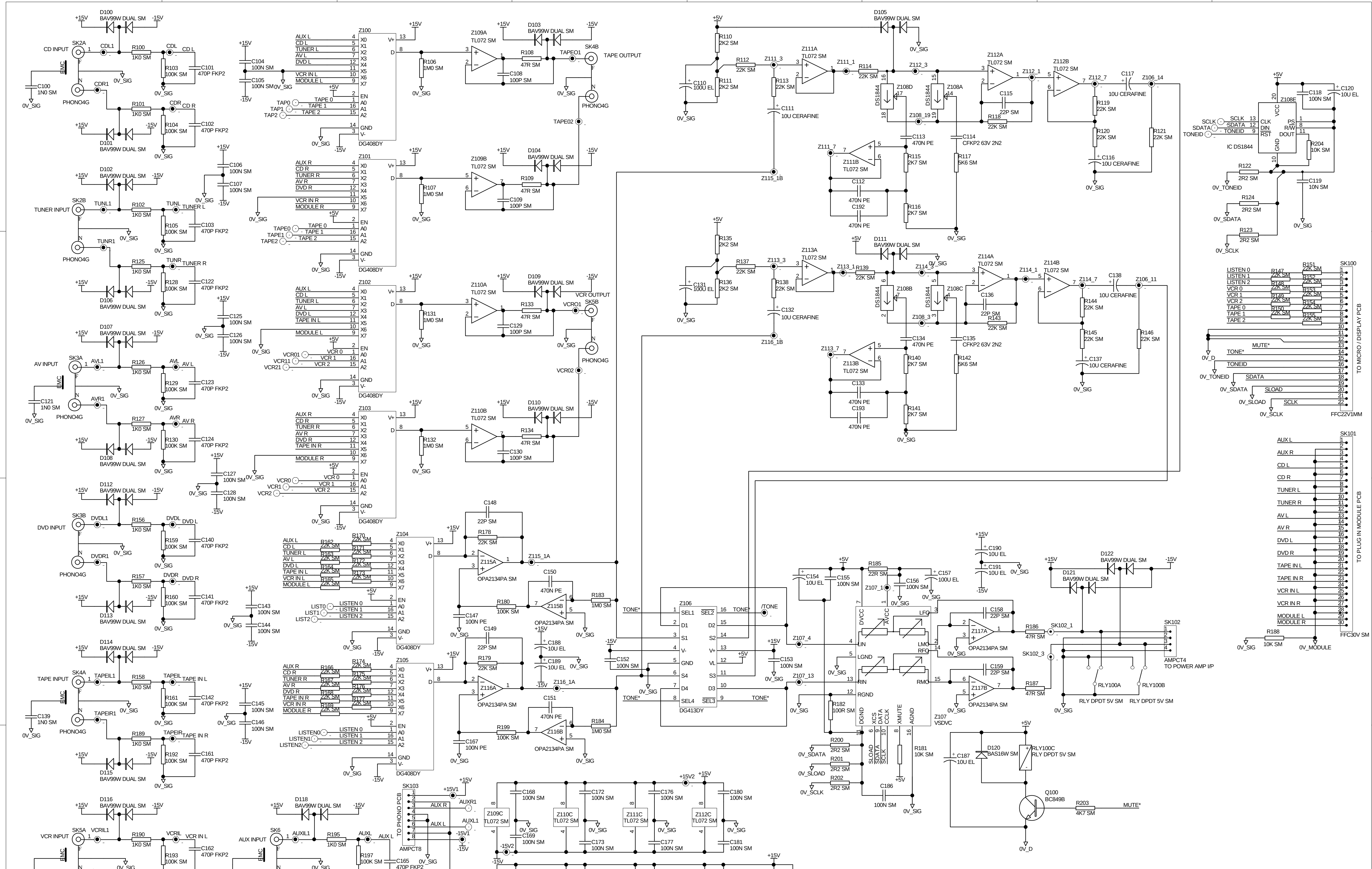
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Date Printed 28-Nov-2001

Drawn by: JBR

Sheet 1 of 3

DRAWING NO. L937C1



DRAWING TITLE

Integrated amplifier preamp - main signal path

Circuit Diagram

23425

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

Notes:

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_E014	JBR	28/11/01	Fuses uprated to 2A	1.1
01_1142	JBR	14/8/01	First production release	1.0

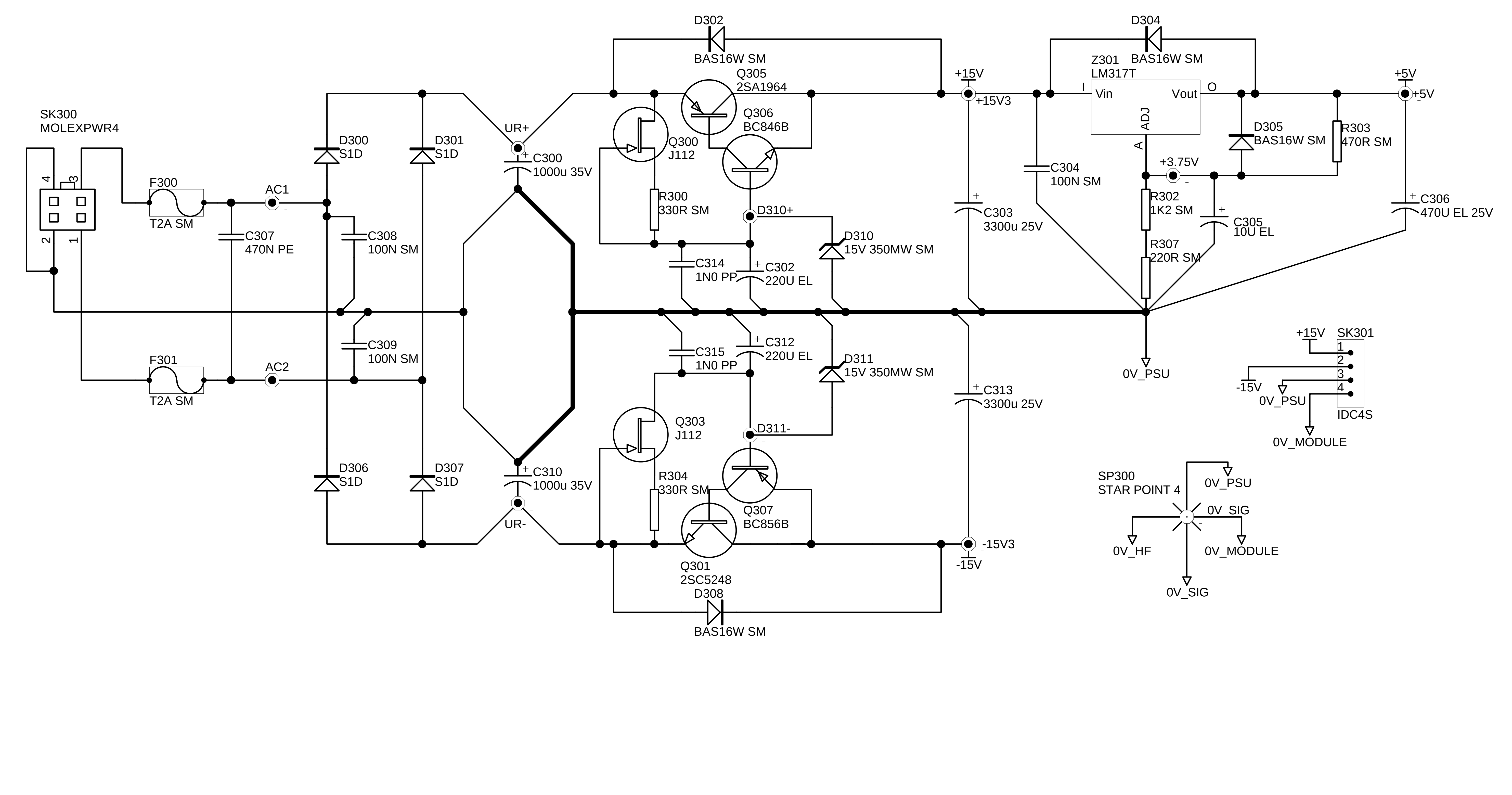
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Date Printed: 28-Nov-2001

Drawn by: JBR

Sheet 2 of 3

DRAWING NO. L937C2



DRAWING TITLE

Integrated amplifier preamp - power supply

Circuit Diagram

2 3 4 2 5

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

Notes:

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_E014	JBR	28/11/01	Fuses uprated to 2A	1.1
01_1142	JBR	14/8/01	First production release	1.0

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Date Printed 28-Nov-2001

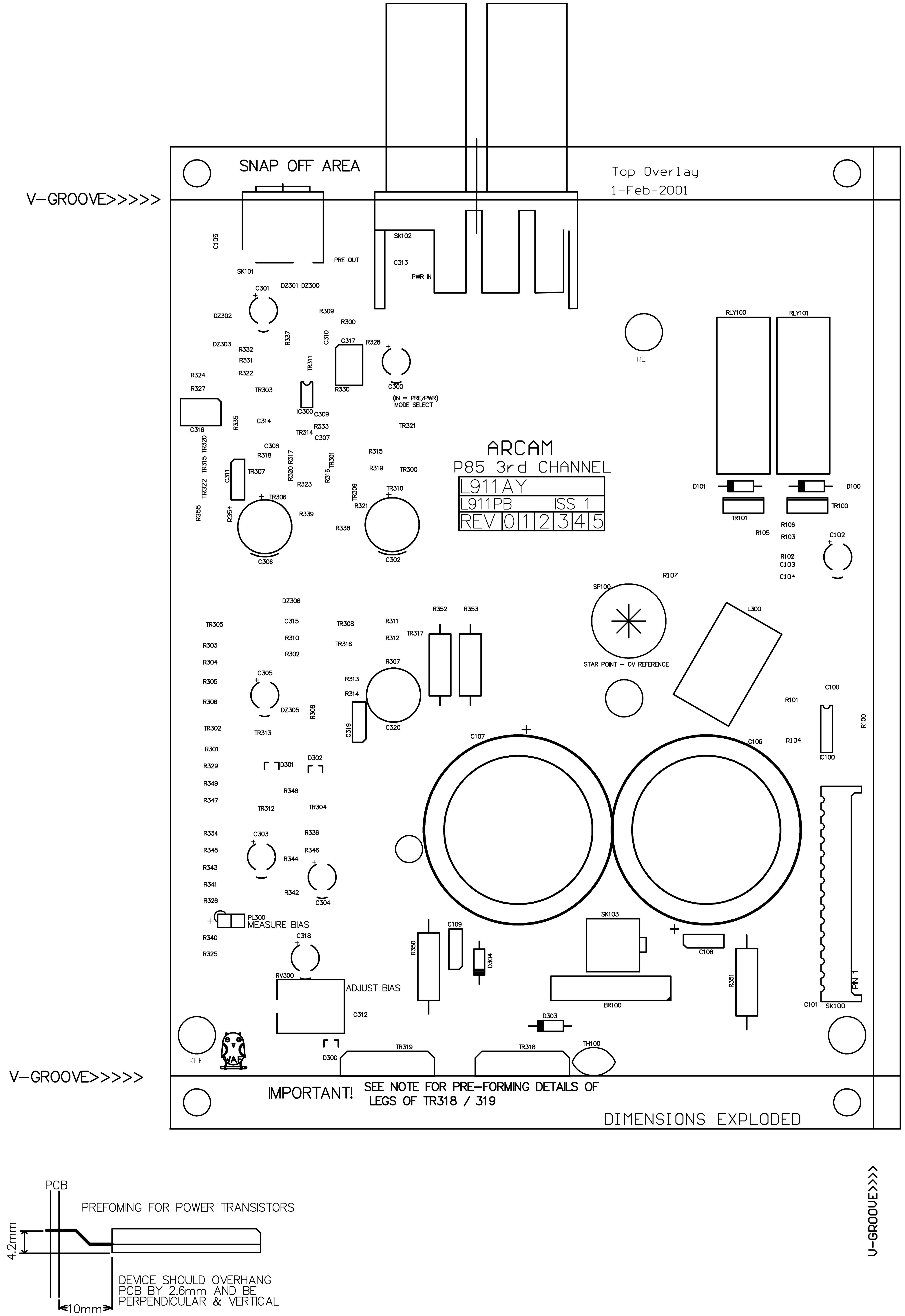
Drawn by: JBR

Sheet 3 of 3

DRAWING NO. L937C3

3rd Channel Board L911

Contents



SNAP OFF AREA
Top Overlay
1-Feb-2001
V-GROOVE>>>>>
ARCAM
P85 3rd CHANNEL
L911AY
L911PB ISS 1
REV 0 1 2 3 4 5
PRE OUT
PWR IN
(N = PRE/PWR) MODE SELECT
STAR POINT - 0V REFERENCE
MEASURE BIAS
ADJUST BIAS
REF
PIN 1
V-GROOVE>>>>>
IMPORTANT! SEE NOTE FOR PRE-FORMING DETAILS OF LEGS OF TR318 / 319
DIMENSIONS EXPLODED
PCB
PREFOMING FOR POWER TRANSISTORS
4.2mm
DEVICE SHOULD OVERHANG PCB BY 2.6mm AND BE PERPENDICULAR & VERTICAL
10mm
V-GROOVE>>>

L911 3rd Channel Amplifier Board Parts List Issue 1.1

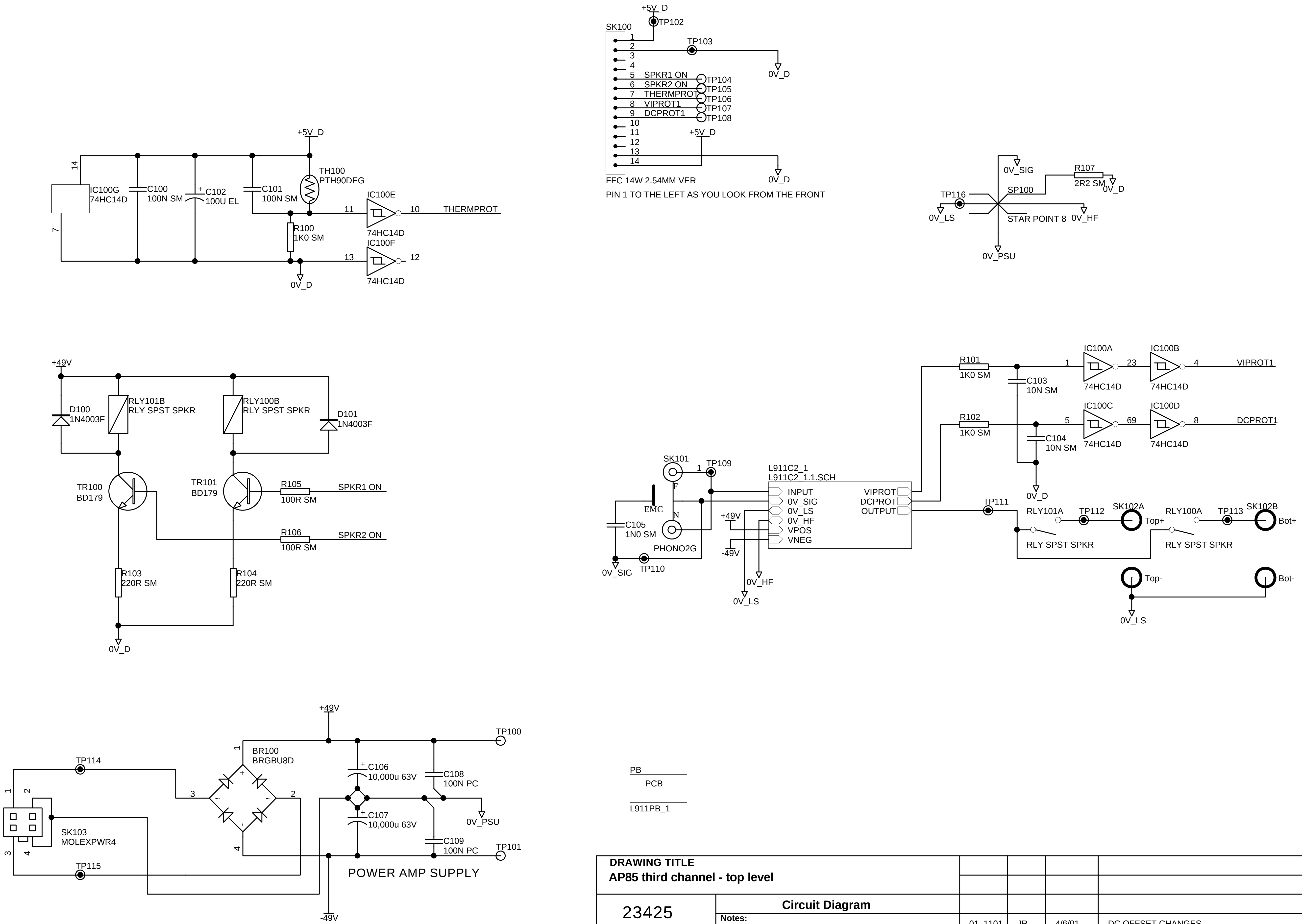
Designator	Part	Description
BR100	3BGBU8D	BRIDGE RECTIFIER 8A 200V
C100	2C410	MLC 100N 50V X7R 10% SM
C101	2C410	MLC 100N 50V X7R 10% SM
C102	2N710	ELST 100U 25V
C103	2C310	MLC 10N 50V X7R 10% SM
C104	2C310	MLC 10N 50V X7R 10% SM
C105	2C210	MLC 1N0 50V X7R 10% SM
C106	2N910A	ELST 10m 63V RA 35mm
C107	2N910A	ELST 10m 63V RA 35mm
C108	2H410	PCRB 100N 100V 10% RA 5mm
C109	2H410	PCRB 100N 100V 10% RA 5mm
C300	2N710	ELST 100U 25V
C301	2N710	ELST 100U 25V
C302	2N710B	ELST 100U 100V
C303	2N710	ELST 100U 25V
C304	2N710	ELST 100U 25V
C305	2N610	ELST 10U 50V
C306	2N710B	ELST 100U 100V
C307	2C110	MLC 100P 50V NPO 5% SM
C308	2C110	MLC 100P 50V NPO 5% SM
C309	2C410	MLC 100N 50V X7R 10% SM
C310	2C410	MLC 100N 50V X7R 10% SM
C311	2H410	PCRB 100N 100V 10% RA 5mm
C312	2C310	MLC 10N 50V X7R 10% SM
C313	2C410	MLC 100N 50V X7R 10% SM
C314	2C410	MLC 100N 50V X7R 10% SM
C315	2C410	MLC 100N 50V X7R 10% SM
C316	2D147W	PPRO W 470P 63V 5% RA
C317	2K447	PEST 470N 63V 10%
C318	2N610	ELST 10U 50V
C319	2K410	PEST 100N 63V 10%
C320	2V710	ELST NON POLAR 100UF 16V
D100	3B4003	RECTIFIER 1N4003F 1A 200V
D101	3B4003	RECTIFIER 1N4003F 1A 200V
D300	3AS16W	DIODE SS SM BAS16W
D301	3AS16W	DIODE SS SM BAS16W
D302	3AS16W	DIODE SS SM BAS16W
D303	3B4003	RECTIFIER 1N4003F 1A 200V
D304	3B4003	RECTIFIER 1N4003F 1A 200V
DZ300	3CW315V	ZENER 15V OW35 SM SOT23
DZ301	3CW315V	ZENER 15V OW35 SM SOT23
DZ302	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ303	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ305	3CW34V7	ZENER 4V7 OW 35 SM SOT23
DZ306	3CW34V7	ZENER 4V7 OW 35 SM SOT23
IC100	5J7414D	SURFACE MOUNT HEX SCHMITT TRIGGER
IC300	5B072D	IC AUDIO SM DUAL TL072
L300	7D002C	INDUCT 2U2 12x20mm
PB	L911PB_1	PCB
PL300	8K6201	2WAY MOLEX VERT MALE CONNECTOR
R100	1A210	RES SM W4 1% 1K0 1206
R101	1A210	RES SM W4 1% 1K0 1206
R102	1A210	RES SM W4 1% 1K0 1206
R103	1A122	RES SM W4 1% 220R 1206
R104	1A122	RES SM W4 1% 220R 1206
R105	1A110	RES SM W4 1% 100R 1206
R106	1A110	RES SM W4 1% 100R 1206
R107	1A822	RES SM W4 1% 2R2 1206
R300	1A310	RES SM W4 1% 10K 1206
R301	1A310	RES SM W4 1% 10K 1206
R302	1A310	RES SM W4 1% 10K 1206
R303	1A310	RES SM W4 1% 10K 1206

L911 3rd Channel Amplifier Board Parts List Issue 1.1

Designator	Part	Description
R304	1A310	RES SM W4 1% 10K 1206
R305	1A310	RES SM W4 1% 10K 1206
R306	1A310	RES SM W4 1% 10K 1206
R307	1A310	RES SM W4 1% 10K 1206
R308	1A322	RES SM W4 1% 22K 1206
R309	1A310	RES SM W4 1% 10K 1206
R310	1A247	RES SM W4 1% 4K7 1206
R311	1A310	RES SM W4 1% 10K 1206
R312	1A310	RES SM W4 1% 10K 1206
R313	1A310	RES SM W4 1% 10K 1206
R314	1A310	RES SM W4 1% 10K 1206
R315	1A110	RES SM W4 1% 100R 1206
R316	1A110	RES SM W4 1% 100R 1206
R317	1A110	RES SM W4 1% 100R 1206
R318	1A110	RES SM W4 1% 100R 1206
R319	1A110	RES SM W4 1% 100R 1206
R320	1A110	RES SM W4 1% 100R 1206
R321	1A022	RES SM W4 1% 22R 1206
R322	1A022	RES SM W4 1% 22R 1206
R323	1A022	RES SM W4 1% 22R 1206
R324	1A210	RES SM W4 1% 1K0 1206
R325	1A210	RES SM W4 1% 1K0 1206
R326	1A210	RES SM W4 1% 1K0 1206
R327	1A322	RES SM W4 1% 22K 1206
R328	1A247	RES SM W4 1% 4K7 1206
R329	1A247	RES SM W4 1% 4K7 1206
R330	1A510	RES SM W4 1% 1M0 1206
R331	1A215	RES SM W4 1% 1K5 1206
R332	1A218	RES SM W4 1% 1K8 1206
R333	1A233	RES SM W4 1% 3K3 1206
R334	1A322	RES SM W4 1% 22K 1206
R335	1A233	RES SM W4 1% 3K3 1206
R336	1A322	RES SM W4 1% 22K 1206
R337	1A022	RES SM W4 1% 22R 1206
R338	1A115	RES SM W4 1% 150R 1206
R339	1A115	RES SM W4 1% 150R 1206
R340	1A410	RES SM W4 1% 100K 1206
R341	1A133	RES SM W4 1% 330R 1206
R342	1A133	RES SM W4 1% 330R 1206
R343	1A110	RES SM W4 1% 100R 1206
R344	1A110	RES SM W4 1% 100R 1206
R345	1A000	RES SM W4 1% 0R0 1206
R346	1A000	RES SM W4 1% 0R0 1206
R347	1A110	RES SM W4 1% 100R 1206
R348	1A110	RES SM W4 1% 100R 1206
R349	1A110	RES SM W4 1% 100R 1206
R350	1C856	RES CF 2W 5R6 5%
R351	1C856	RES CF 2W 5R6 5%
R352	1J147	RES 2W MF 5% 470R
R353	1J147	RES 2W MF 5% 470R
R354	1A210	RES SM W4 1% 1K0 1206
R355	1A268	RES SM W4 1% 6K8 1206
RLY100	A213	RLY SPST 24V SPKR
RLY101	A213	RLY SPST 24V SPKR
RV300	6F110	PRES 100R LIN HORIZ
SK100	8K7014	FFC 14W 2.54MM VER PTH
SK101	8D226	PHONO SKT 2-WAY EMC GOLD
SK102	8D418G	CAMCON BINDING POST 4WAY GOLD
SK103	8K2304	MOLEX MINI FIT 4 WAY
TH100	1T002	THERMISTOR SIEMENS B59008
TR100	4B179	NPN TRANS MP BD179
TR101	4B179	NPN TRANS MP BD179

L911 3rd Channel Amplifier Board Parts List Issue 1.1

Designator	Part	Description
TR300	4AFMMT597	TRANS LF SS P SM FMMT597
TR301	4AFMMT597	TRANS LF SS P SM FMMT597
TR302	4AFMMT597	TRANS LF SS P SM FMMT597
TR303	4AFMMT597	TRANS LF SS P SM FMMT597
TR304	4AFMMT597	TRANS LF SS P SM FMMT597
TR305	4AFMMT597	TRANS LF SS P SM FMMT597
TR306	4AFMMT597	TRANS LF SS P SM FMMT597
TR307	4AFMMT597	TRANS LF SS P SM FMMT597
TR308	4AFMMT597	TRANS LF SS P SM FMMT597
TR309	4AFMMT497	TRANS LF SS N SM FMMT497
TR310	4AFMMT497	TRANS LF SS N SM FMMT497
TR311	4AFMMT497	TRANS LF SS N SM FMMT497
TR312	4AFMMT497	TRANS LF SS N SM FMMT497
TR313	4AFMMT497	TRANS LF SS N SM FMMT497
TR314	4AFMMT497	TRANS LF SS N SM FMMT497
TR315	4AFMMT497	TRANS LF SS N SM FMMT497
TR316	4AFMMT497	TRANS LF SS N SM FMMT497
TR317	4AFMMT497	TRANS LF SS N SM FMMT497
TR318	4CSAP15N	TRANS POWER NPN SAP15N
TR319	4CSAP15P	TRANS POWER PNP SAP15P
TR320	4AFMMT497	TRANS LF SS N SM FMMT497
TR321	4AFMMT597	TRANS LF SS P SM FMMT597
TR322	4AFMMT497	TRANS LF SS N SM FMMT497



DRAWING TITLE

AP85 third channel - top level

23425

Circuit Diagram

Notes:

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_1101	JR	4/6/01	DC OFFSET CHANGES	1.1
01_1018	JR	30/1/01	PRODUCTION ISSUE	1.0

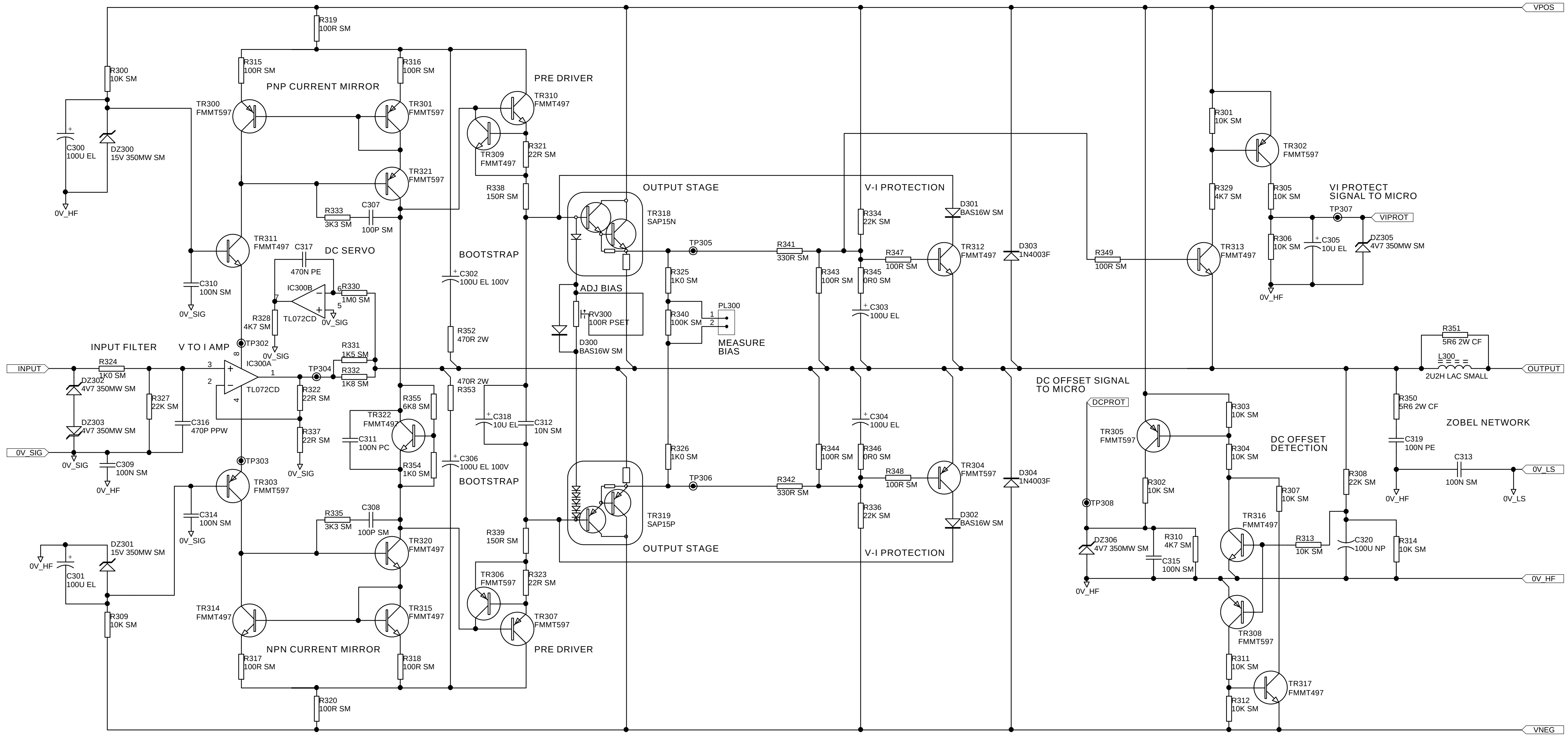
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Date Printed 4-Jun-2001

Drawn by: J Reckless

Sheet 1 of 2

DRAWING NO. L911C1



DRAWING TITLE

AP85 third channel - output stage

23425

Circuit Diagram

Notes:

A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_1101	JR	4/6/01	DC OFFSET CHANGES	1.1
01_1018	JR	30/1/01	PRODUCTION ISSUE	1.0

Filename L911C2_1.1.SCH

Date Printed 4-Jun-2001

Drawn by: J Reckless

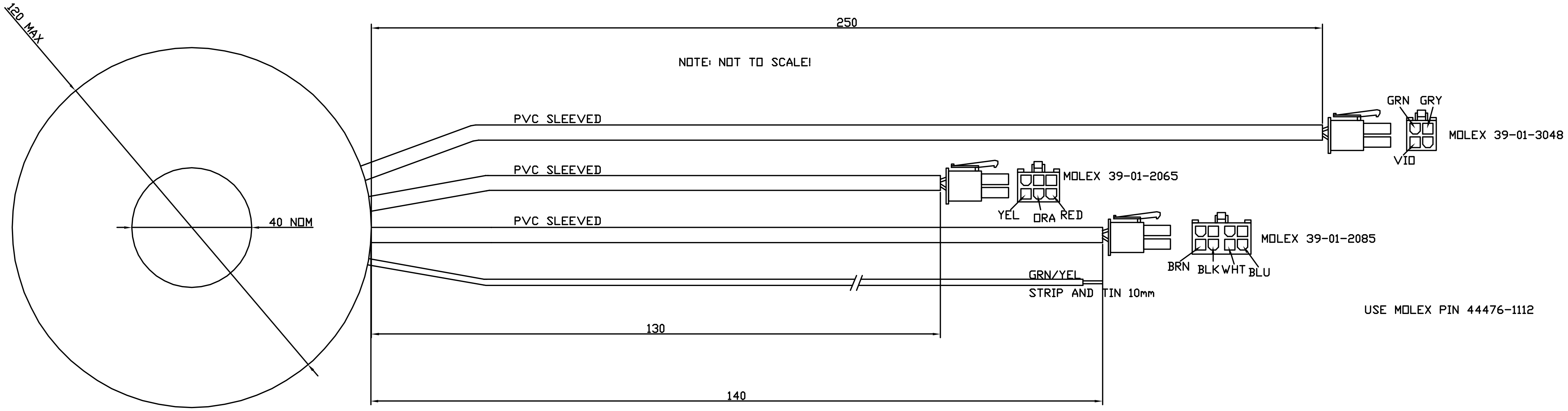
Sheet 2 of 2

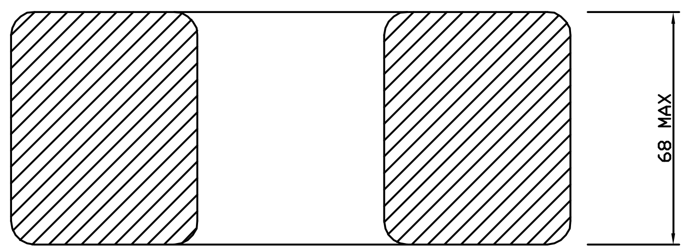
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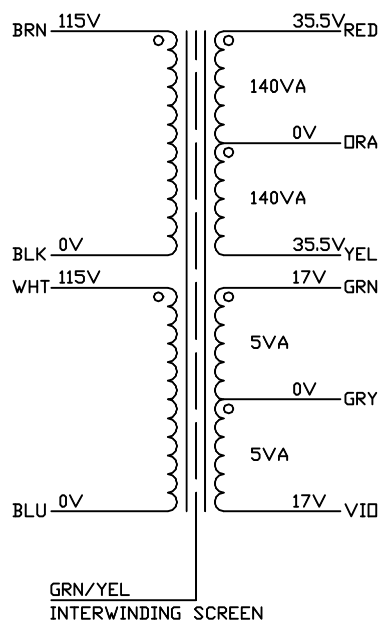
Transformer Specifications

Contents

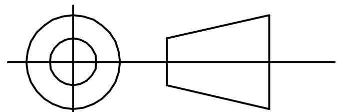
RevNo	Revision note	Date	Signature	Checked



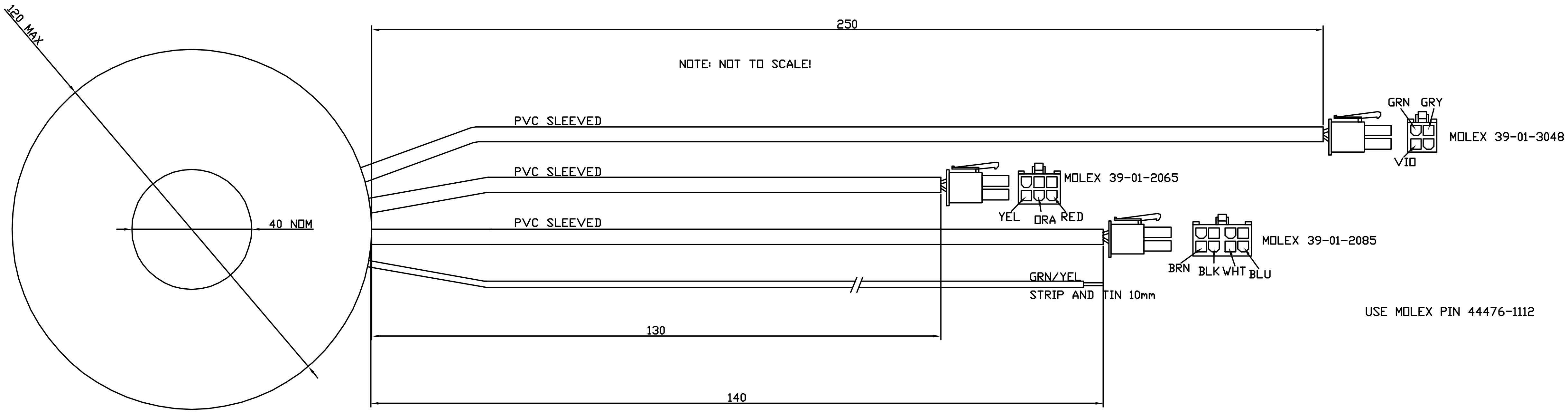


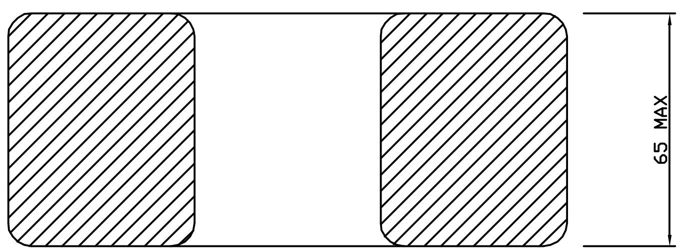


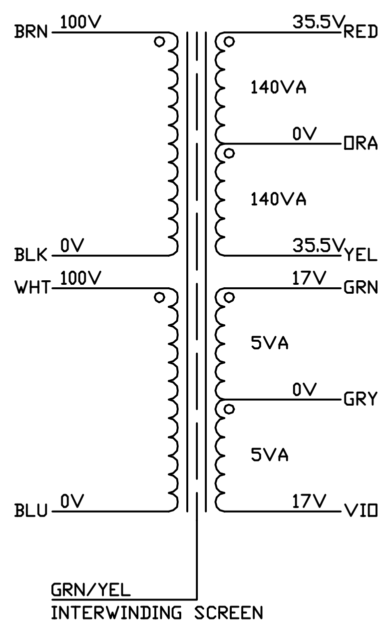
GENERAL NOTES:
ALL VOLTAGES SPECIFIED ARE NOMINAL RMS
WINDINGS TO BE EVENLY SPACED WITH NO GAPS
MINIMISE SEPARATION OF LEAD OUT WIRES
MAGNETIC RADIATION SHOULD BE MINIMISED
MAX CORE FLUX DENSITY 1.7T AT NOMINAL RATING
MAX OFF-LOAD PRIMARY CURRENT 130mA PER WINDING (NOMINAL VOLTAGE)
TEMPERATURE RISE TO BE LESS THAN 60 DEG AT 30% DUTY CYCLE
TO STANDARDS BS415 / EN60065 / CLASS I / EN60742 / UL506
ALL WIRES TO BE 20AWG UL1015 RATED OR GREATER
OFF LOAD SECONDARY RMS VOLTAGES TO BE LESS THAN 10% ABOVE RATED ON-LOAD
CORE MUST NOT SATURATE AT 20% OVER VOLTAGE



Itemref	Quantity	A32 MAINS TRANSFORMER		Article No./Reference	
Designed by J RECKLESS	Checked by		Filename	Date 10 SEP 2001	Scale N.T.S.
L914TX		A&R CAMBRIDGE LIMITED (ARCAM)		ISSUE 1	







GENERAL NOTES:
ALL VOLTAGES SPECIFIED ARE NOMINAL RMS
WINDINGS TO BE EVENLY SPACED WITH NO GAPS
MINIMISE SEPARATION OF LEAD OUT WIRES
MAGNETIC RADIATION SHOULD BE MINIMISED
MAX CORE FLUX DENSITY 1.7T AT NOMINAL RATING
MAX OFF-LOAD PRIMARY CURRENT 130mA PER WINDING (NOMINAL VOLTAGE)
TEMPERATURE RISE TO BE LESS THAN 60 DEG AT 30% DUTY CYCLE
TO STANDARDS BS415 / EN60065 / CLASS I / EN60742 / UL506
ALL WIRES TO BE 20AWG UL1015 RATED OR GREATER
OFF LOAD SECONDARY RMS VOLTAGES TO BE LESS THAN 10% ABOVE RATED ON-LOAD
CORE MUST NOT SATURATE AT 20% OVER VOLTAGE

RevNo	Revision note	Date	Signature	Checked

Itemref	Quantity	A32 MAINS TRANSFORMER 100V		Article No./Reference	
Designed by J RECKLESS	Checked by		Filename	Date 31 MAY 2000	Scale N.T.S.
L915TX		A&R CAMBRIDGE LIMITED (ARCAM)			
				ISSUE 1	

Mechanical Assembly

Contents

A32 General Assembly Parts List E047rs_2

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
A	L813RC					HANDY REMOTE 3 DIVA/DIVA SERIES CR389		1
B			L907TX			TRANSF A85 100V		1
1				E045AY	E045AYB	FRONT PANEL ASSEMBLY		1
7				E838CP	E838CPB	COVER		1
39				E839AY	E839AYB	LARGE VOLUME KNOB		1
35				HA4V06S	HA4V06B	M4 x 6mm Screw	COVER TO CHASSIS	4
54	N/A					N/A		
2	E046AY					REAR PANEL ASSEMBLY		1
3	E804HK					HEAT SINK		1
4	E804MI					MAINS INSULATOR	ON CHASSIS FLOOR UNDER POWER SUPPLY PCB	1
5	E820CH					CHASSIS		1
6	E822PM1					FOOT		6
8	E850MC					HEAT SHUNT	ON CHASSIS FLOOR	1
9	E853MC					PRE AMP REG CLAMP	E850MC	1
10	E860MC					DIVA A85 MODULE SLOT BLANKING PANEL		1
51	E878MC					PHONO BOARD BRACKET	FIXES PHONO BOARD	1
38	E879SL					CONFIGURATION LABEL	CHASSIS	1
40	E907MC					KOOL PAD	HEATSINK	1
12	E912MC					TRANSISTOR CLAMP	ON E804HK	4
13	E920MC					HEATSINK CLAMP	ON E804HK	1
14	E938MC					DAMPING PLATE	ON CHASSIS FLOOR	1
16	F022					FUSE HOLDER COVER		2
17	F037					TOROID CLAMP ø90	TOP OF TRANSFORMER	1
18	F038					RUBBER WASHER ø90	ON TOP OF TRANSFORMER	1
19	F062					FUSE CLIP	SPARE FUSE	1
20	F065					ADHESIVE CABLE CLIP	TRANSFORMER	1
21	F082					TO220 SIL PAD	UNDER VOLTAGE REG	3
41	F164					FOAM TAPE	FRONT PANEL TO COVER	400mm
49	E83001					TRANSFORMER GASKET	UNDER TRANSFORMER	1
22	HA3V10A					M3 x 10mm SCREW	HEATSHUNT	2
48	HA3V06A					M3 x 6mm SCREW	POWER, PREAMP & DISPLAY PCB'S	31
37	HA4A12B					M4 x 12mm SCREW	EARTHING SCREWS	2
24	HA5K70A					M5 x 70mm BOLT	HEATSINK SCREWS	3
23	HA5L20B					M5 x 20mm HEX HEAD BOLT BLACK	TRANSISTORS TO HEATSINK	4
25	HA6K60A					M6 x 60mm BOLT	TRANSFORMER	1
47	HE6V06B					SFTP TORX SCREW NO.6x6mm BK		4
46	HF4V09B					TORX SCREW NO.4x9mm + WASHER		20
36	HJ4A00A					M4 NUT	EARTHING NUT	1
42	HJ4C00D					M4 WAISTED NUT	EARTH	1
43	HL4SB					M4 SHAKE PROOF WASHER	EARTH	1
44	HL5EB					M5 WASHER BLACK	HEATSINK SCREWS	3
52	HP008					PLASTIC SNAP RIVET	E878MC TO L870AY	1
45	HP008					SNAP RIVET BLACK PLASTIC	BLANKING PLATES	4

A32 General Assembly Parts List E047rs_2

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
A	L813RC					HANDY REMOTE 3 DIVA/DIVA SERIES CR389		1
B			L907TX			TRANSF A85 100V		1
50	L870AY					PHONO PCB	THROUGH REAR PANEL	1
28	L882AY	WA8511A	L894AY			A85 POWERAMP PCB		1
31	L914CA					DISPLAY TO PRE AMP CABLE ASSY		1
30	L914TX		L915TX			A32 TRANSFORMER		1
32	L915CA					DISPLAY TO POWERAMP CABLE ASSY		1
33	L916CA					POWERAMP TO HEADPHONE CABLE ASSY		1
34	L917CA					PREAMP TO POWERAMP CABLE ASSY		1
53	L918CA					PHONO TO PREAMP CABLE ASSY		1
29	L928AY					A32 DISPLAY PCB		1
27	L937AY					A32 PREAMP PCB		1

P35 General Assembly Parts List E078rs_2

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
1				E058AY	E058AYB	FASCIA ASSEMBLY	FRONT OF CHASSIS	1
2				E838CP	E838CPB	COVER		1
3				HA4V06S	HA4V06B	M4 x 6mm Screw	COVER (SIDE) TO CHASSIS	4
4	8K004					2-WAY JUMPER SOCKET 0.1" M7571-05	ON L882AY (NEAR SWITCH)	2
5	8K006					CONNECTOR 14MM LINK BAR P2148	FITTED TO REAR PANEL	1
7	E060AY					REAR PANEL ASSEMBLY	CHASSIS REAR	1
8	E804HK					HEAT SINK	CHASSIS FLOOR	1
9	E804MI					MAINS INSULATOR	ON CHASSIS FLOOR UNDER POWER SUPPLY PCB	1
10	E820CH					CHASSIS		1
11	E822PM1					FOOT	BASE OF CHASSIS	6
12	E861MC					3RD CHANNEL BLANKING PLATE	REAR PANEL	1
13	E879SL					CONFIGURATION LABEL	CHASSIS	1
14	E907MC					KOOL PAD	HEATSINK	1
15	E912MC					TRANSISTOR CLAMP	HEATSINK	4
16	E920MC					HEATSINK CLAMP	HEATSINK	1
17	E938MC					DAMPING PLATE	ON CHASSIS FLOOR	1
18	F022					FUSE HOLDER COVER		2
19	F037					TOROID CLAMP ø90 (METAL)	TOP OF TRANSFORMER	1
20	F038					RUBBER WASHER ø90	ON TOP OF TRANSFORMER	1
21	F164					FOAM TAPE	FRONT PANEL TO COVER	400mm
22	F200					9,5 I.D. HOLE BLANKING GROMMET	REAR PANEL (FOR LINK BAR)	2
23	E83001					TRANSFORMER GASKET	UNDER TRANSFORMER	1
24	HA3V06A					M3 x 6mm SCREW	POWER & DISPLAY PCB'S	17
25	HA4A12B					M4 x 12mm SCREW	EARTHING SCREW	1
26	HA5K70A					M5 x 70mm BOLT	HEATSINK BOLTS	3
27	HA5L20B					M5 x 20mm HEX HEAD BOLT BLACK	TRANSISTORS TO HEATSINK	4
28	HA6K60A					M6 x 60mm BOLT	TRANSFORMER	1
29	HE6V06B					SFTP TORX SCREW NO.6x6mm BK	CHASSIS TO SUB PANEL	4
30	HF4V09B					TORX SCREW NO.4x9mm + WASHER	COMPONENTS TO REAR PANEL + COVER TO REAR PANEL + REAR PANEL TO CHASSIS	16
31	HJ4A00A					M4 NUT	EARTHING NUT	1
32	HJ4C00D					M4 WAISTED NUT	EARTH	1
33	HL4SB					M4 SHAKE PROOF WASHER	EARTH	1
34	HL5EB					M5 WASHER BLACK	HEATSINK BOLT (AT THE FRONT)	1
35	L882AY	WA8511A	L894AY			A85 POWERAMP PCB	CHASSIS FLOOR	1
36	L884TX	L884TX	L880TX			TRANSFORMER	CHASSIS FLOOR	1
37	L915CA					DISPLAY TO POWERAMP CABLE ASSY	L882AY TO L929AY	1
38	L929AY					P35 SWITCH PCB	SUB PANEL	1

P35/3 Channel General Assembly Parts List E079rs_2

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
1				E058AY	E058AYB	FASCIA ASSEMBLY	FRONT OF CHASSIS	1
2				E839CP	E839CPB	COVER		1
3				HA4V06S	HA4V06B	M4 x 6mm Screw	COVER (SIDE) TO CHASSIS	4
4	8K004					2-WAY JUMPER SOCKET 0.1" M7571-05	ON L882AY (NEAR SWITCH)	2
5	8K006					CONNECTOR 14MM LINK BAR P2148	FITTED TO REAR PANEL	1
7	E060AY					REAR PANEL ASSEMBLY	CHASSIS REAR	1
8	E804HK					HEAT SINK	CHASSIS FLOOR	1
9	E804MI					MAINS INSULATOR	ON CHASSIS FLOOR UNDER POWER SUPPLY PCB	1
10	E806HK					HEAT SINK	CHASSIS FLOOR	1
11	E820CH					CHASSIS		1
12	E822PM1					FOOT	BASE OF CHASSIS	6
13	E879SL					CONFIGURATION LABEL	CHASSIS	1
14	E907MC					KOOL PAD	HEATSINK	1
15	E909MC					3RD CHANNEL SIL PAD	HEATSINK	1
16	E912MC					TRANSISTOR CLAMP	HEATSINKS	6
17	E921MC					HEATSINK CLAMP	HEATSINK	1
18								2
19	E938MC					DAMPING PLATE	ON CHASSIS FLOOR	1
20								
21	F037					TOROID CLAMP ø90 (METAL)	TOP OF TRANSFORMER	1
22	F038					RUBBER WASHER ø90	ON TOP OF TRANSFORMER	1
23	F164					FOAM TAPE	FRONT PANEL TO COVER	400mm
24	F200					9,5 I.D. HOLE BLANKING GROMMET	REAR PANEL (FOR LINK BAR)	2
25	E83001					TRANSFORMER GASKET	UNDER TRANSFORMER	1
26	HA3V06A					M3 x 6mm SCREW	PCB'S	22
27	HA4A12B					M4 x 12mm SCREW	EARTHING SCREW	1
28	HA5K70A					M5 x 70mm BOLT	HEATSINK BOLTS	5
29	HA5L20B					M5 x 20mm HEX HEAD BOLT BLACK	TRANSISTORS TO HEATSINK	6
30	HA6K60A					M6 x 60mm BOLT	TRANSFORMER	1
31	HE6V06B					SFTP TORX SCREW NO.6x6mm BK	CHASSIS TO SUB PANEL	4
32	HF4V09B					TORX SCREW NO.4x9mm + WASHER	COMPONENTS TO REAR PANEL + COVER TO REAR PANEL + REAR PANEL TO CHASSIS	16
33	HJ4A00A					M4 NUT	EARTHING NUT	1
34	HJ4C00D					M4 WAISTED NUT	EARTH	1
35	HL4SB					M4 SHAKE PROOF WASHER	EARTH	1
36	HL5EB					M5 WASHER BLACK	HEATSINK BOLT (AT THE FRONT)	1
37	L882AY	WA8511A				A85 POWERAMP PCB	CHASSIS FLOOR	1
38	L884TX	L884TX	L880TX			TRANSFORMER	CHASSIS FLOOR	1
39	L911AY	WA85Q1A				3RD CHANNEL PCB	CHASSIS FLOOR	1
40	L915CA					SWITCH TO POWERAMP CABLE ASSY	L882AY TO L929AY	2
41	L919CA					SWITCH TO 3RD CHANNEL CABLE ASSY		1
42	L929AY	WFA35P 1A				P35 SWITCH PCB	SUB PANEL	1

ARCAM

All parts can be ordered via spares@arcam.co.uk

Pembroke Ave, Waterbeach, Cambridge, CB5 9PB, ENGLAND
TEL: +44(0) 1223 203 203 FAX: +44(0) 1223 863 384